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SERUM LIPIDS IN ECZEMA AND IN OTHER PATHOLOGIC CONDITIONS

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MINNEAPOLIS

In a preliminary study it was found that the degree of unsaturation of the serum lipids was less in a small group of infants with eczema than in a group of normal infants of similar ages.[1] A possible relationship between a disturbance in the fat metabolism and the occurrence of eczema was further suggested by the following observations: (1) In certain patients with intractable eczema clinical improvement was shown when oils rich in the unsaturated fatty acids were administered internally for variable lengths of time, and (2) at the same time the iodine numbers of the serum lipids rose to essentially normal levels. It seemed advisable, therefore, to extend the study and to include other pathologic conditions to determine the degree of specificity of the relationship. The following report deals with the broader aspects of the problem.

PROCEDURE

In this investigation no attempt was made to differentiate the various types of eczema. However, because of the transitory nature of many of the cutaneous eruptions occurring in infants, only patients whose eczema had already proved to be more or less refractory to ordinary forms of treatment were included. Particular care was taken not to include patients who had shortly before been subjected to rigid dietary restrictions or to unusual medication, who had recently had fever or who had lost or gained an excessive amount of weight.

The specimens of blood were taken after a fast of from twelve to fifteen hours. Patients from the dispensary, especially those with eczema, were kept in the hospital overnight to insure the proper interval of fasting. Whenever possible, parallel determinations were made on an eczematous and a normal person. The blood serum was extracted with a mixture composed of three parts of alcohol to one part of ether. Bloor's [2] methods were used for the determination of the

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1. Hansen, Arild E.: Study of Iodine Number of Serum Fatty Acids in Infantile Eczema, Proc. Soc. Exper. Biol. & Med. **30**:1198, 1933.

2. Bloor, W. R.: The Determination of Small Amounts of Lipid in Blood Plasma, J. Biol. Chem. **77**:53, 1928.

cholesterol and the total fatty acid content. The iodine absorption value of the serum was obtained with the alcohol-ether extract by use of the Rosenmund-Kuhnhenn [3] method as modified by Page, Pasternak and Burt.[4] Yasuda's [5] technic was followed except that hundredth-normal instead of twentieth-normal sodium thiosulfate was used for the titration. The sum of the cholesterol and the total fatty acid content was considered the total lipid content. The iodine number of the fatty acids of the serum was calculated on the assumption that 100 mg. of cholesterol absorbs 66 mg. of iodine.

In addition, a small series of determinations were made by means of the microgravimetric technic devised by Wilson and Hansen.[6] With this procedure the average iodine number, the average molecular weight and the number of double

TABLE 1.—*The Serum Lipids in Normal Children Under 2 Years of Age*

Case No.	Sex	Age, Mo.	I_2 Absorbed, Mg. per 100 Cc.	Cholesterol, Mg. per 100 Cc.	Total Fatty Acids, Mg. per 100 Cc.	I_2 No. of Total Fatty Acids	Total Lipids, Mg. per 100 Cc.
32	♂	11	514	213	361	104	574
13	♂	8	477	160	339	110	499
40	♀	10	711	232	411	136	643
41	♂	13	508	150	407	101	557
13	♂	10	540	212	354	113	566
43	♂	7	386	142	297	100	434
14	♂	5	470	176	312	113	488
50	♀	9	457	162	259	135	421
14	♂	5.5	551	180	361	120	541
53	♂	1	462	167	364	97	531
14	♂	6	427	142	302	114	444
54	♂	6	344	157	238	101	385
14	♂	8	488	198	329	109	527
54	♂	6.5	285	107	219	98	326
55	♀	12	471	128	353	109	481
57	♂	12	483	184	337	107	521
32	♂	16	650	196	386	135	582
32	♂	16	529	200	288	137	488
57	♂	12.5	565	171	320	139	491
57	♂	12.5	513	191	301	128	492
58	♂	3	403	144	284	108	428
68	♂	7	416	188	290	103	478
75	♀	23	494	151	317	124	468
79	♀	6	607	206	456	103	662
92	♀	20	596	200	439	106	639
93	♂	6	457	170	346	100	516
97	♂	7	405	128	327	98	445
99	♂	12	594	232	378	117	610
110	♀	11	425	164	292	109	456
110	♂	12	423	170	243	127	417
120	♀	11	541	216	316	126	532

bonds per molecule of the isolated fatty acids of the blood serum are obtained. The results are presented in tables 1 to 7.

3. Rosenmund, K. W., and Kuhnhenn, W.: Eine neue Methode zur Jodzahlbestimmung in Fetten und Olen unter Vervendung von Pyridinsulfatdibromid, Ztschr. f. untersuch. d. Nahrungs.- u. Genussmittel **46**:154, 1923.

4. Page, H. H.; Pasternak, L., and Burt, M. L.: Ueber den Transport von Fetten und Lipoiden durch Blut nach Öleingabe, Biochem. Ztschr. **223**:445, 1930.

5. Yasuda, M.: The Determination of the Iodine Number of Lipids, J. Biol. Chem. **94**:401, 1931.

6. Wilson, W. R., and Hansen, A. E.: Study of the Serum Lipids by a Microgravimetric Technique, J. Biol. Chem. **112**:457, 1936.

TABLE 2.—*The Serum Lipids in Eczematous Children Under 2 Years of Age*

Case No.	Sex	Age, Mo.	I_2 Absorbed, Mg. per 100 Cc.	Cholesterol, Mg. per 100 Cc.	Total Fatty Acids, Mg. per 100 Cc.	I_2 No. of Total Fatty Acids	Total Lipids, Mg. per 100 Cc.
8	♂	6	362	142	328	82	470
1	♂	8	404	143	443	69	586
2	♀	8	509	130	449	94	579
1	♂	8.5	487	165	427	88	592
6	♂	8	417	159	340	92	499
42	♀	10	370	150	345	78	495
42	♀	10	369	170	309	83	479
2	♂	9.5	416	160	360	86	520
2	♂	9.5	410	155	380	81	535
45	♂	6	307	148	261	80	409
45	♂	6.5	441	208	380	80	588
4	♀	8.5	389	168	354	78	522
6	♂	11	369	162	330	79	492
6	♂	11.5	350	198	295	74	493
52	♂	3.5	550	209	495	83	704
6	♂	12	373	198	333	73	531
9	♂	14	435	195	385	79	580
5	♀	7	504	157	488	81	645
3	♂	3	395	154	302	95	456
4	♀	10.5	378	167	327	83	494
3	♂	4	391	146	307	96	453
76	♂	14	496	196	344	106	540
12	♂	5	444	160	357	94	517
112	♂	12	537	182	457	91	619
109	♂	6	619	230	549	84	779
121	♀	9	522	136	344	126	480
128	♀	6	445	114	389	95	503

TABLE 3.—*The Serum Lipids in Normal Children from 2 to 15 Years of Age*

Case No.	Sex	Age, Yr.	I_2 Absorbed, Mg. per 100 Cc.	Cholesterol, Mg. per 100 Cc.	Total Fatty Acids, Mg. per 100 Cc.	I_2 No. of Total Fatty Acids	Total Lipids, Mg. per 100 Cc.
45	♀	14	788	240	480	130	720
59	♂	7	550	240	347	113	587
61	♂	5	386	200	215	117	415
62	♂	5	633	178	378	137	556
63	♀	11	541	196	339	121	535
64	♂	9	479	204	312	110	516
65	♂	12	486	191	330	109	521
67	♂	12	590	236	385	115	621
70	♂	10	579	238	306	137	544
82	♀	13	612	263	347	126	610
86	♂	4.5	550	204	313	132	517
87	♂	6	535	198	346	117	544
88	♀	15	748	281	416	135	697
89	♀	10	527	184	305	133	489
90	♂	11	547	196	350	119	546
91	♂	6	532	224	318	121	542
16	♀	10	661	212	455	115	667
16	♀	10	639	236	430	112	666
94	♂	6	527	206	358	109	564
95	♀	13	472	170	309	116	479
98	♀	8	501	178	327	117	505
100	♂	6	585	180	414	113	594
101	♂	4	543	182	334	127	516
102	♀	12	519	228	311	119	539
103	♂	15	490	174	279	136	453
104	♀	2.5	546	198	307	135	505
105	♂	8	637	182	443	115	625
106	♀	11	483	166	334	112	500
108	♂	9	683	160	494	117	654
111	♀	3.5	673	186	504	109	690
123	♂	3	556	188	383	112	571
131	♀	15	486	160	312	122	472

TABLE 4.—*The Serum Lipids in Eczematous Children from 2 to 15 Years of Age*

Case No.	Sex	Age, Yr.	I_2 Absorbed, Mg. per 100 Cc.	Cholesterol, Mg. per 100 Cc.	Total Fatty Acids, Mg. per 100 Cc.	I_2 No. of Total Fatty Acids	Total Lipids, Mg. per 100 Cc.
44	♀	3.5	453	175	360	93	535
56	♂	4.5	397	143	377	80	520
11	♀	3	479	190	327	108	517
80	♀	7	466	176	340	102	516
81	♀	13	527	210	368	105	578
10	♂	3	535	225	380	101	605
10	♂	3	611	250	463	96	713
107	♂	9	494	176	367	103	543
125	♀	2.5	560	200	343	125	563

TABLE 5.—*The Serum Lipids in Normal Persons Over 15 Years of Age*

Case No.	Sex	Age, Yr.	I_2 Absorbed, Mg. per 100 Cc.	Cholesterol, Mg. per 100 Cc.	Total Fatty Acids, Mg. per 100 Cc.	I_2 No. of Total Fatty Acids	Total Lipids, Mg. per 100 Cc.
49	♂	23	651	221	428	118	649
72	♀	45	602	318	275	140	593
78	♂	37	664	252	402	124	654
78	♂	37	775	252	504	121	756
83	♂	24	667	233	428	119	661
114	♂	26	697	216	474	115	690
116	♂	26	796	294	522	115	816
122	♀	23	718	262	437	125	699
124	♂	25	659	208	407	128	615
126	♀	25	762	220	477	139	697
129	♀	24	485	150	302	127	452
130	♀	24	664	208	482	109	690
131	♀	16	486	160	312	122	472
132	♀	26	551	192	393	108	585

TABLE 6.—*The Serum Lipids in Various Pathologic Conditions*

Case No.	Sex	Age, Yr.	Diagnosis	I_2 Absorbed, Mg. per 100 Cc.	Cholesterol, Mg. per 100 Cc.	Total Fatty Acids, Mg. per 100 Cc.	I_2 No. of Total Fatty Acids	Total Lipids, Mg. per 100 Cc.
49	♂	23	Acne vulgaris	651	221	428	118	649
39	♂	6 mo.	Dermatitis exfoliativa	416	118	317	104	435
48	♀	9	Schüller-Christian's disease	510	174	337	117	511
51	♂	14	Hypoparathyroidism	564	252	290	137	542
45	♀	14	Obesity	788	240	480	130	720
15	♂	6	Celiac disease	387	150	316	88	466
65	♂	12	Rheumatic fever	486	191	330	109	521
72	♀	46	Hypertension	602	318	275	140	593
82	♀	13	Seborrheic dermatitis	612	263	347	126	610
84	♀	8	Ichthyosis	618	246	397	115	643
85	♂	5	Ichthyosis	509	178	320	123	498
91	♀	6	Chorea minor	532	224	318	121	542
90	♂	11	Little's disease	547	196	350	119	546
94	♂	6	Osteogenic sarcoma	527	206	358	109	564
95	♀	13	Mastoiditis	472	170	309	116	479
98	♂	10	Appendicitis	501	178	327	117	505
99	♂	13 mo.	Acute folliculitis	594	232	378	117	610
100	♂	7	Progressive muscular dystrophy	585	180	414	113	594
102	♀	12	Epilepsy	519	228	311	119	539
103	♂	15	Chorea minor	490	174	279	136	453
111	♀	3.5	Glycogenic hepatomegaly	673	186	504	109	690
113	♀	3 mo.	Erythroderma desquamativum (Leiner)	488	148	364	107	512
114	♂	26	Seborrhoea sicca	697	216	474	115	690
116	♂	27	Seborrhoea sicca	796	294	522	115	816
120	♂	11 mo.	Rickets	541	216	316	126	532
124	♂	26	Seborrhoea sicca	659	208	407	128	615
131	♀	15	Obesity	486	160	312	122	472
133	♀	25	General xanthoma	589	232	416	105	648

COMMENT ON RESULTS

The values for the cholesterol, total fatty acids and total lipids for the eczematous patients (tables 2 and 4) do not differ significantly from those found for corresponding control subjects (tables 1 and 3). The values for the various fractions of the serum lipids for the normal groups (tables 1, 3 and 5) and for the group with miscellaneous pathologic conditions (table 6) are in essential agreement with each other and with those obtained by other workers using similar methods.[7] Faber[8] found the serum cholesterol content to be slightly higher in

TABLE 7.—*Values for the Various Fractions of the Serum Lipids in Normal and in Eczematous Children Found by the Microgravimetric Technic of Wilson and Hansen*

			Unsaponifiable Fraction		Saponifiable Fraction				
Case No.	Sex	Age, Mo.	Amount, Mg. per 100 Cc.	I_2 Number	Amount, Mg. per 100 Cc.	Titration Value, Cc. N/50 Alkali	Molecular Weight	I_2 Number	Double Bonds per Molecule
					Normal Children				
147	♂	5	243	62	298	0.54	280	116	1.28
152	♂	24	362	62	382	0.66	290	112	1.28
155	♂	24	250	..	277	0.49	284	112	1.25
159	♀	24	285	60	401	0.68	295	100	1.16
161	♀	2	201	60	414	0.68	294	100	1.16
Average			268	61	354	0.61	289	108	1.23
					Eczematous Children				
149	♀	5.5	260	58	357	0.62	285	93	1.04
153	♂	2	162	65	287	0.48	299	90	1.06
149	♀	6	244	..	340	0.61	278	89	0.97
157	♂	1	204	65	364	0.65	278	87	0.95
163	♂	6	110	66	239	0.41	297	86	1.00
167	♂	3	145	69	304	0.56	270	95	1.00
163	♂	6.5	122	62	218	0.38	287	88	0.99
170	♂	6	152	68	284	0.50	284	78	0.89
172	♀	2	160	61	371	0.67	276	87	0.94
Average			173	64	307	0.58	285	88	0.98

eczematous than in noneczematous infants. Although the serum cholesterol values appear to be lower on the average for my children under 2 years of age than for those over 2 (tables 1 and 2), no statistical relationship was found to exist between the various groups. When repeated determinations were made on the same subject, only the first value obtained was used in the statistical analysis of the data. The summary of the data so treated is presented in table 8.

7. Bloor.[2] Page and others.[4] Peters, J. P., and Van Slyke, D. D.: Quantitative Clinical Chemistry, Baltimore, Williams & Wilkins Company, 1931, vol. 1, p. 238. Boyd, E. M.: A Differential Lipid Analysis of Blood Plasma in Normal Young Women by Micro-Oxidative Methods, J. Biol. Chem. **101**:323, 1933.

8. Faber, H. K., and Brown, D. M.: Serum Proteins and Lipids in Infantile Eczema, Proc. Soc. Exper. Biol. & Med. **30**:335, 1932.

TABLE 8.—*Mean, Probable Error of the Mean and Standard Deviation of the Values for the Serum Lipids of the Various Groups Studied*

Type	No. of Cases	Iodine Absorption, Mg. per 100 Cc.		Cholestreol, Mg. per 100 Cc.		Total Fatty Acids, Mg. per 100 Cc.		I_2 No. of Total Fatty Acids / I_2, Mg. / Total Fatty Acids, Mg.		Total Lipids, Mg. per 100 Cc.	
		Mean and Probable Error	Standard Deviation	Mean and Probable Error	Standard Deviation	Mean and Probable Error	Standard Deviation	Mean and Probable Error	Standard Deviation	Mean and Probable Error	Standard Deviation
Normal, under 2 yr.....	22	495.5 ± 14.5	100.8	176.0 ± 4.6	32.1	339.4 ± 6.2	43.0	112.0 ± 3.7	11.8	519.2 ± 11.4	79.5
Eczematous, under 2 yr.....	16	445.6 ± 14.2	84.5	163.8 ± 5.9	34.9	387.3 ± 12.5	74.0	87.0 ± 2.2	12.0	551.3 ± 16.0	95.1
Normal, over 2 yr.....	28	564.5 ± 11.7	92.1	199.3 ± 3.4	26.3	358.7 ± 6.0	47.1	120.9 ± 1.1	9.0	558.0 ± 12.1	95.4
Eczematous, over 2 yr.....	8	498.4 ± 8.9	62.1	190.0 ± 4.2	29.4	368.1 ± 5.1	39.4	101.5 ± 1.7	11.9	560.6 ± 8.8	61.5
With miscellaneous diseases.....	15	626.8 ± 15.6	89.6	230.8 ± 8.3	47.6	389.6 ± 13.2	75.7	122.6 ± 2.7	15.4	619.8 ± 16.4	94.4

As reported previously,[1] the total iodine absorbed per unit of serum was less for the eczematous infants under 2 years of age (table 2) than for a similar group of normal children (table 1). The most striking finding, however, was in the calculated iodine number of the fatty acids of the serum, which is low for both groups of eczematous patients. These differences in the iodine value of the fatty acids for the corresponding groups (table 1 and 3 and tables 2 and 4) are statistically significant. The average iodine number obtained for the isolated fatty acid fraction of the serum lipids by use of the technic of Wilson and Hansen is in close agreement with these findings (table 7). The values for the various fractions of the serum lipids for the control group are essentially the same as the values found by those authors. By calculating from the molecular weight and the iodine absorption, it is found that the fatty acid content of the serum of the normal subjects averages 1.23 double bonds per molecule, whereas for the eczematous patients it averages only 0.98. The finding of a low degree of unsaturation of the fatty acids of the serum in eczematous infants has been confirmed recently by Faber and Roberts.[9] Additional evidence of the abnormally low degree of unsaturation of the blood fat in patients with eczema has been obtained by Hansen and Brown.[10] These workers found the actual level of the highly unsaturated 2 and 4 double bond linolic and arachidonic acids to be lower in the serum of eczematous infants than in that of control subjects of similar ages.

GENERAL COMMENT

In the interpretation of these findings one must consider the many factors which are known to affect the iodine number of the blood fats. The most important of these are age, the character of the diet, the status as to infection, prolonged starvation, excessive muscular exercise and certain pathologic conditions, including anemia, and the degree of activity of certain hormones. It is shown by my data (fig. 1) that the fatty acids of the serum tend to be less unsaturated in younger than in older subjects. Recent data obtained by Hansen and Brown[11] indicate that the same difference occurs with rats. The average ages for

9. Faber, H. K., and Roberts, D. B.: Studies of Serum Lipids in Infantile Allergic Eczema with Special Reference to Saturation of Fatty Acids, J. Pediat. **6**:490, 1935.

10. Brown, W. R., and Hansen, Arild E.: The Linolic and Arachidonic Acid Content of the Serum, to be published.

11. Hansen, Arild E., and Brown, W. R.: Effect of Diet on the Serum Lipids: I. Rats Fed on Low-Fat Diets; II. Rats Fed on High-Fat Diets, Proc. Div. Biol. Chem., Am. Chem. Soc., Kansas City, Mo., April 16, 1936.

the comparable groups of the present study were similar. Therefore, age is not the factor which accounts for the difference observed in the iodine number of the fatty acids of the serum.

The chief factor which may influence the character of the blood lipids is the diet. That the dietary fat directly affects the nature of the body fat is a well established scientific reality. This is of considerable economic importance in connection with the "soft pork" problem. The work of Hansen and Burr [12] showed that the character of the serum lipids can be changed by dietary means. These workers found that for rats on a fat-free diet the iodine number of the serum lipids was lower than it was for control rats on a regular diet, a finding which was confirmed independently by Williams and Maynard [13] in the course of studies on lactation in goats. Further studies [11] with rats demonstrated that the degree of unsaturation of the blood lipids is directly

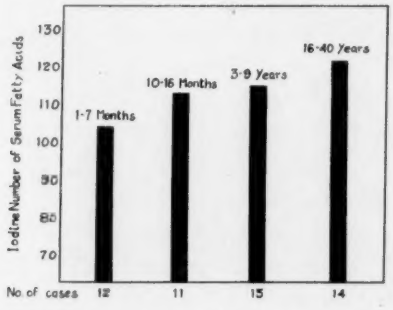

Fig. 1.—The average iodine number of the fatty acids of the serum for various age groups of normal persons.

related to the iodine number of the dietary fats, a finding similar to that of Anderson and Mendel [14] for the body fats. This was also demonstrated in the studies on fat metabolism of Hansen, Wilson and Williams [15] with dogs. One normal human being was found to have a drop in the degree of unsaturation of his serum lipids when he was maintained for more than six months on an experimental diet extremely

12. Hansen, Arild E., and Burr, George O.: Iodine Numbers of Serum Lipids in Rats Fed on Fat-Free Diets, Proc. Soc. Exper. Biol. & Med. **30**:1201, 1933.

13. Williams, H. H., and Maynard, L. A.: The Effect of Specific Dietary Fats on the Blood Lipids of Lactating Goats, J. Dairy Sc. **17**:223, 1934.

14. Anderson, W. E., and Mendel, L. B.: The Relation of Diet to the Quality of Fat Produced in the Animal Body, J. Biol. Chem. **76**:729, 1928.

15. Hansen, Arild E.; Wilson, W. R., and Williams, H. H.: Serum Lipid Changes in Relation to the Intermediary Metabolism of Fat, J. Biol. Chem. **114**: 209, 1936.

low in fat.[16] Many eczematous patients have an increase in the iodine number of the fatty acids of the serum when oils with a high degree of unsaturation are administered internally for variable lengths of time.[17] Anderson and Anderson [18] observed that leprous patients treated with chaulmoogra oil had increased iodine numbers of the fatty acids of the serum.

The fact that dietary fats may influence the character of the blood lipids, together with the fact that patients with eczema are often restricted to diets low in fat, suggests the possibility of a causal relationship of the diet to the findings of this study. However, every effort was made not to include any patient who had been subjected to unusual dietary restrictions. Repeated examinations of the blood lipids over a period of more than four months of two noneczematous infants with clubfoot and two infants with eczema showed that the iodine numbers of the fatty acids of the serum differed consistently in spite of the fact that the diet was essentially the same for the four subjects. Of the eczematous infants, patient 1 had iodine values of 69, 81, 86 and 81 during a four month period of observation, and patient 6 showed values of 92, 79, 74 and 73 during a six month period. Of the normal infants, patient 13 showed values of 110 and 113, and patient 14, values of 113, 120, 114 and 109 during like periods. A study of the breast milk from the mothers of eczematous infants is being made. However, we have as yet seen no indication that the diet accounts for the low degree of unsaturation of the serum lipids of breast-fed eczematous subjects.

It is well known that infants with eczema are unusually susceptible to infection. Achard, Grigaut, Leblanc and David [19] found that the iodine number of the fatty material of the blood falls with infection and rises slowly in convalescence. McQuarrie and Stoesser [20] demonstrated that the various lipids of the serum are significantly decreased during acute infections, and Stoesser [21] subsequently found that the

16. Brown, W. R.; Hansen, Arild E.; Burr, G. O., and McQuarrie, I.: Observation on the Serum Lipids and Respiratory Quotient in a Human Being on a Prolonged Fat-Poor Regimen, to be published.

17. Hansen, Arild E.: Serum Lipid Changes and Therapeutic Effects of Various Oils in Infantile Eczema, Proc. Soc. Exper. Biol. & Med. **31**:160, 1933.

18. Anderson, H. H., and Anderson, J. V. D.: Iodine Values and Total Lipids of Leprous Human Blood Sera, Proc. Soc. Exper. Biol. & Med. **32**:1470, 1935.

19. Achard, C.; Grigaut, A.; Leblanc, A., and David, M.: L'équilibre lipoidique du sérum sanguin dans les maladies aiguës, J. de physiol. et de path. gén. **26**:415, 1928.

20. McQuarrie, I., and Stoesser, A. V.: Influence of Acute Infection and Artificial Fever on Plasma Lipids, Am. J. Dis. Child. **49**:658 (March) 1935.

21. Stoesser, A. V.: Effect of Acute Infection on Iodine Number of Serum Fatty Acids, Proc. Soc. Exper. Biol. & Med. **32**:1326, 1935.

iodine number of the fatty acids of the serum tends to be lower than normal at the height of the febrile period. Boyd [22] more recently showed that this decrease in iodine number is preceded in most instances by a transitory increase. The initial rise may account in large part for the temporary improvement in the eczematous condition which is not infrequently observed at the onset of any acute febrile illness. No patient who had recently suffered from an acute infection was included in the present investigation.

The recent studies of Hansen, Wilson and Williams [15] showed that during prolonged starvation the serum lipids of experimental animals tend to have a rather constant composition and the fatty acids of the serum a characteristic iodine number. This constancy was found to be maintained even when the blood of the animals had been greatly altered by their previous diets. However, uniform intervals of fasting were used throughout the present study. While some evidence has been presented which indicates that excessive muscular exercise may cause transitory lipemia,[23] no difference was found between the character of the blood lipids of an eczematous infant after a period during which there was practically no crying and their character after vigorous crying for a period of fifteen or twenty minutes. Stewart, Gaddie and Dunlop [23b] were unable to find any change in the iodine numbers of the blood fats after exercise. Therefore, we believe that exercise is of no importance. Determinations of the blood lipids after the ingestion of a fatty meal in a small series of cases revealed no evidence of delay in absorption or deposition of the ingested fat to account for the low iodine values found for the eczematous patients. In normal subjects the cholesterol fraction of the blood lipids increases under the influence of ether anesthesia.[24] Patient 16 (table 3) was found to have a slight increase in cholesterol two hours after ether anesthesia, but the iodine number of the fatty acids of the serum remained essentially unchanged. No other patient in this series was subjected to anesthesia. Ling and Liu [25] have pointed out that the hyperlipemia occurring with nephrosis and diabetes mellitus is characterized by a low iodine number of the serum fatty acids. No cases of lipemia of this type, however, were included in the present series. The only noneczematous patient for

22. Boyd, E.: Lipopenia of Fever, Canad. M. A. J. **32**:500, 1935.

23. (*a*) Patterson, J. W. T.: Blood Fat and Exercise, Biochem. J. **21**:958, 1927. (*b*) Stewart, C. P.; Gaddie, R., and Dunlop, D. M.: Fat Metabolism in Muscular Exercise, ibid. **25**:733, 1931.

24. Mahler, A.: Blood Cholesterol During Ether Anaesthesia, J. Biol. Chem. **69**:653, 1926.

25. Ling, S. M., and Liu, S. H.: Studies on Plasma Lipoids: I. Fatty Acids of Blood Plasma in Diabetes and Nephrosis, Chinese J. Physiol. **2**:157. 1928.

whom the iodine number of the fatty acids of the serum was abnormally low possibly had celiac disease (patient 15, table 6). Bloor [26] and Bodansky [27] have both pointed out that experimental anemia may be associated with a high degree of unsaturation of the blood lipids. Although mild secondary anemia was present in some of our eczematous patients as well as in some of our control patients, there is nothing to indicate that this factor played an important part in either group. Certain hormones are believed to affect the degree of unsaturation of the blood and body fats,[28] but this too probably does not enter into consideration here. In short, every attempt was made to control extraneous factors known to influence the character of the blood lipids.

Since allergy is related to eczema, a study of the blood lipids was made with a small series of patients with asthma and hay fever. Hansen and Dyson [29] observed that patients with uncomplicated hay fever and asthma had values for the various fractions of the serum lipids which were essentially the same as those found for a group of control subjects. For patients having eczema in addition to asthma or hay fever, however, the iodine numbers of the fatty acids of the serum were nearly as low as those for a group of patients of similar ages suffering from eczema alone. It must be emphasized that not all patients with eczema have a low degree of unsaturation of the fatty acids of the serum. Particularly is this true for the older age groups.

In a previous publication [17] it was stated that clinical improvement was noted in certain infants with intractable eczema when oils rich in the unsaturated fatty acids were administered internally. Up to the present time about fifty patients with eczema have been treated by this method. Approximately one half of these therapeutic experiments have been purely clinical. Faber and Roberts [9] were unable to detect any difference between the incidence of recovery for patients treated in this way and the incidence of recovery for those subjected to the usual therapeutic procedures. Taub and Zakon [30] observed that in a

26. Bloor, W. R.: Plasma Lipoids in Experimental Anemia, J. Biol. Chem. **63**:1, 1925.

27. Bodansky, M.: The Distribution of the Unsaturated Fatty Acids, Cholesterol and Cholesterol Esters in Experimental Anemia, J. Biol. Chem. **63**:239, 1925.

28. Nicholls, E. G., and Perlzweig, W. A.: Plasma Fats and Iodine Absorption Capacity of Fatty Acids in Hyperthyroidism, J. Clin. Investigation **5**:195, 1928. Reed, L. L.; Anderson, W. E., and Mendel, L. B.: Factors Influencing the Distribution and Character of Adipose Tissue in the Rat: II. The Effect of Ovariectomy and Feeding with Thyroxine, J. Biol. Chem. **96**:313, 1932.

29. Hansen, Arild E., and Dyson, Ralph H.: The Blood Lipids in Allergical Conditions in Children, to be published.

30. Taub, S. J., and Zakon, S. J.: The Use of Unsaturated Fatty Acids in the Treatment of Eczema (Atopic Dermatitis, Neurodermatitis), J. A. M. A. **105**:1675 (Nov. 23) 1935.

small series of cases of atopic dermatitis (neurodermatitis) some patients were actually worse after taking raw linseed oil internally. On the other hand, Cornbleet [31] reported uniformly good results when oils rich in the unsaturated fatty acids were given to a rather large series of patients with chronic eczema.

Adequate evaluation of therapeutic procedures for eczema is admittedly difficult. The facts that so many methods of treatment have been proposed and that such diverse opinions and results are reported emphasize the unsatisfactory state of knowledge concerning the problem. The uncertainty as to proper criteria for diagnosis, together with the danger of confusion due to a characteristic tendency to spontaneous remissions and recurrences, should make one cautious in drawing rigid conclusions. Nevertheless, the clinical recovery of patients with refractory eczema previously reported [17] as resulting from the administration of oils with high iodine numbers, such as oil from corn or linseed, appears to be a more or less specific response in that it was accompanied by a significant rise in the iodine number of the fatty acids of the serum. This phenomenon was observed first in three infants with severe eczema, whereas a control infant with eczema who was not given the oil supplements failed to respond clinically, and the iodine number of the fatty acids of the serum actually decreased during a five month period of observation. The changes in the iodine number of the fatty acids of the serum in cases 1, 2 and 7, as well as the findings for the control subject (case 6) are presented in figure 2. A detailed discussion of the correlation of the blood findings with the clinical condition of the patient will be presented at a later date. However, in nine instances in which the degree of unsaturation of the serum lipids was low, the same general changes occurred as are illustrated in figure 2. In one instance of extremely stubborn infantile eczema (case 4) there was only slight improvement in the condition of the skin after the use of raw linseed oil, but it was interesting to observe that the iodine number did not rise as definitely as it did in the other cases. The definite increase in the degree of unsaturation of the serum lipids in these nine instances, in addition to the clinical impression of a favorable response to the administration of oils rich in the unsaturated fatty acids in a relatively large number of patients with intractable eczema, makes it appear that a disturbance in the lipid metabolism is related in part at least to the pathogenesis of eczema.

In a small series of cases it was observed that the iodine numbers of the fatty acids of the serum tended to rise when crude coal tar

31. Cornbleet, T.: Use of Maize Oil (Unsaturated Fatty Acids) in Treatment of Eczema: Preliminary Report, Arch. Dermat. & Syph. **31**:224 (Feb.) 1935.

therapy was used.[32] It is a well known clinical observation that untreated areas, as well as treated portions of the skin, improve with such local applications. This fact suggests that a constitutional as well as a local effect may be exerted by this procedure. Haendel and Malet [33] found that definite changes occurred in the lipids of the skin, liver and adrenal cortex of mice when tar was applied locally. Although these findings are suggestive, they need confirmation before an interpretation is attempted.

SUMMARY AND CONCLUSIONS

The values for cholesterol content, total fatty acid content and iodine absorption of the serum were determined for seventy normal subjects and an equal number of patients suffering from a variety of clinical disorders, including eczema. Interest centered chiefly about twenty-three infants and eight older children with eczema. The great majority of eczematous subjects showed a significant lowering of the iodine number of the fatty acids of the serum when compared with normal subjects of similar ages. This alteration was demonstrated to be independent of

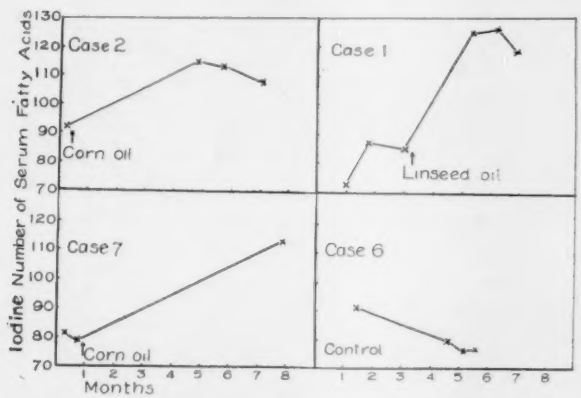

Fig. 2.—Increase in the iodine number of the fatty acids of the serum following the administration of raw linseed oil or corn oil in three cases of eczema (1, 2 and 7). In each instance definite clinical improvement was observed after about three weeks. Subject 6, a control infant without eczema, was not given an oil supplement. No particular change in the clinical picture was noted, and the degree of unsaturation of the serum lipids remained low.

32. Hansen, Arild E.: Possible Mechanism of Crude Coal Tar Therapy in Infantile Eczema, Proc. Soc. Exper. Biol. & Med. **31**:161, 1933.

33. Haendel, M., and Malet, J.: Ueber die Beziehungen des Geschwulstwachstums zur Ernährung und zum Stoffwechsel: IV. Mitteilung Teerpinselung und Gewebslipoide, Ztschr. f. Krebsforsch. **29**:324, 1929.

such important factors as previous diet and infection. The degree of saturation of the fatty acids of the serum was found to be essentially normal in a series of noneczematous patients presenting a wide variety of pathologic conditions. A significant rise in the iodine number of the serum lipids of eczematous subjects followed the administration of large doses of oils with high iodine numbers. Coincident with this increase in the degree of unsaturation of the fatty acids of the serum in many instances was an unmistakable improvement in the clinical condition of the patient. These observations strongly suggest a fundamental relationship between the pathogenesis of eczema and a disturbance in lipid metabolism.

RÔLE OF THE PERIPHERAL CIRCULATION IN PNEUMONIA IN CHILDREN

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There is a diversity of opinion regarding the relative importance of the various factors concerned with circulatory failure accompanying the more serious attacks of lobar pneumonia. Of these factors, much stress has been laid on a fall in the systolic blood pressure and a persistently rapid heart rate. Gibson [1] maintained that if the blood pressure as measured in millimeters of mercury falls below the pulse rate the prognosis is bad. In contrast to Gibson's observations are those of Newburgh and Minot,[2] who noted that the blood pressure curve in fatal cases of pneumonia does not suggest that there is a failure of the vasomotor center. The results obtained by Newburgh and Minot clearly indicated (1) that the systolic pressure of patients with fatal attacks is continuously above the systolic pressure of persons who recover, (2) that the diastolic pressure of patients who recover show a slight but progressive fall while the systolic pressure remains nearly level and (3) that the pulse pressure increases as the crisis is approached. Newburgh and Minot concluded that prognostic inferences based on the relation of the systolic pressure curve to the pulse curve (Gibson's rule) are wrong more often than they are right.

Ritchie [3] spoke of the symptoms of circulatory failure as "toxaemic shock" and expressed the belief that the condition is more often the direct sequel of failure at the periphery of the circulation than it is of heart failure. More definite evidence of the rôle played by the peripheral circulation in acute lobar pneumonia has been provided by Perry.[4] He demonstrated in a study of a group of adults that at the height of the disease there is an impaired efficiency of the contractility of the small blood vessels of the skin—that the circulatory failure in lobar pneumonia is really one of the peripheral circulation.

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1. Gibson, G. A.: Some Lessons from the Study of the Arterial Pressure, Edinburgh M. J. **23**:17, 1908.

2. Newburgh, L. H., and Minot, G. R.: The Blood Pressure in Pneumonia, Arch. Int. Med. **14**:48 (July) 1914.

3. Ritchie, W. T.: The Treatment of Circulatory Failure, Glasgow M. J. **115**:161, 1931.

4. Perry, C. B.: The Peripheral Circulation in Acute Lobar Pneumonia, Quart. J. Med. **3**:273, 1934.

What I had seen of the behavior of children gravely ill with pneumonia led me to undertake an investigation similar in scope to that of Perry. My study comprised fifty-two children, ranging in age from 1 to 12 years. The observations were limited to the period of the child's stay in the hospital, which as a rule was short. As soon after his admission to the hospital as possible the following data were obtained for each child: (1) blood pressure, (2) the response of the skin to epinephrine puncture and (3) the back pressure on the circulation required to obliterate the blanching produced by epinephrine puncture. These tests were made daily whenever possible; otherwise they were repeated at intervals of two or more days.

Before I enumerate these findings, it will be of interest to review briefly the observations of others who have studied the blood pressure in pneumonia. One is impressed by the fact that various investigators of this subject hold diametrically opposed views. A review of the literature reveals differences of opinion concerning absolute standards for blood pressure in normal children. The variations which are obtained are explained on the basis of such factors as weight, height, sex, race, heredity and the effect of emotions. Then, too, there is a diurnal variation, which in Diehl's [5] study among normal, young, active college students approximated 9.5 mm. of mercury. I have studied the diurnal variation in a small group of children convalescing in the hospital and in two of my own normal children, and over a period of time I found a daily variation not exceeding 10 mm. of mercury.

The view of Gibson has already been noted. Weigert [6] studied the blood pressure in patients with a variety of infectious diseases, including pneumonia, and found the statements of his predecessors so contradictory that he could draw no conclusions from them. In his own patients (adults) there was so much variation that he could not establish a rule for the blood pressure curve in pneumonia, and he expressed the consequent opinion that readings of blood pressure are of no prognostic value. Nassau [7] found that a low or falling blood pressure in children indicates an unfavorable progress of the disease. Gilbert and Castaigne [8] reported similar observations but no change in pressure during the crisis.

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5. Diehl, H. S.: The Variability of Blood Pressure; Morning and Evening Studies, Arch. Int. Med. **43**:835 (June) 1929.

6. Weigert, K.: Ueber das Verhalten des arteriellen Blutdrucks bei den akuten Infektionskrankheiten, Samml. klin. Vortr. no. 459, 1907 (Inn. Med., no. 138, p. 65).

7. Nassau, E.: Die Bronchopneumonie im Säuglingsalter, Klin. Wchnschr. **5**:1953, 1926.

8. Gilbert, A., and Castaigne, J.: La tension arterielle dans la pneumonie, Rev. gén. de clin. et de thérap. **13**:769, 1899.

Kaufmann and de Bary [9] found a lowered pressure during the crisis. Lidzka [10] classified his series of children with pneumonia into four groups:

1. Children in whom the blood pressure was normal throughout the course of the disease. All of this group recovered.

2. Those in whom both the systolic and the diastolic pressure rose during the course of the disease. All of them also recovered although in the meantime the condition of some was serious.

3. Those in whom the systolic pressure rose and the diastolic pressure fell, while the pulse pressure increased. Half of this group died.

4. Those in whom both the systolic and the diastolic pressure fell. All of these children died.

Perry [4] noted the blood pressure at intervals during the course of the disease and found that in the majority of the patients with nonfatal attacks the systolic pressure was higher before this crisis and fell immediately afterward. The diastolic pressure was less affected by this change, so that the pulse pressure also fell after the crisis. For three patients with fatal attacks the last systolic and diastolic readings before death were, respectively, 130 and 70, 140 and 75, and 100 and 70.

Eivine and Zelditsch [11] also studied the blood pressure during the course of the acute phase of pneumonia in a group of eighty-seven children. They found the pressure definitely increased in forty of them, slightly increased in fifteen, unchanged in twenty-nine and decreased in three.

Daily readings of blood pressure for my study were obtained by the auscultatory method, a baumanometer with a 9 cm. cuff being used, at nearly the same time each day. The findings are recorded in table 1. The behavior of the systolic pressure in each patient can best be studied by comparing the figures obtained during the acute stage of the disease with those after the crisis. In thirty-four patients the difference in the systolic pressure before and after the crisis was more than 11 mm. of mercury (11 to 28 mm.). In ten patients (including those with attacks resolving by lysis) it was less than 11 mm. of mercury, and in four patients there was no change.[12] Perhaps more patients might have been

9. Kaufmann, J., and de Bary, W.: Ueber die Einwirkung Priessnitzscher Einwickelung auf den Blutdruck bei croupöser Pneumonie, Berl. klin. Wchnschr. **25**:557, 1888.

10. Lidzka, P.: Blood Pressure in Pneumonic Children and Its Prognostic Significance, Pediat. polska **9**:403, 1931.

11. Eivine, P., and Zelditsch, L.: Sur la pression sanguine au cours de certaines affections aiguës des enfants, Arch. de méd. d. enf. **38**:133, 1935.

12. Patients who died not included.

included in the first group if all the patients had entered the hospital earlier in the course of the disease rather than one or two days before the crisis was reached. The basis for the latter statement is made obvious by reference to chart 1, which reveals a downward trend in

TABLE 1.—*Résumé of Observations on Systolic Blood Pressure in Children with Pneumonia During Their Stay in the Hospital*

	Day of Illness													
Case No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	...	...	114	114	108	100	**96**	94	...	92	...	98	...	94
2	...	...	...	...	...	104	100	**94**	...	94	...	92	...	92
3	...	...	110	...	**100**	...	...	...	102	...	...	...	...	...
4	...	...	...	100	104	...	98	...	98	...	98	...	...	104
5	...	...	...	...	104	...	**98**	92	...	...	90	...	...	...
6	...	100	96	98	...	**80**	...	...	...	...	...	...	...	...
7	...	104	...	96	...	...	98	...	...	...	98	...	...	...
8	114	...	118	108	...	108	112	104	116	...	...	...	**96**	110
9	...	...	100	106	...	...	**100**	...	...	...	90	...	...	...
10	106	96	...	**92**	...	...	94	...	...	...	...	...	...	...
11	...	...	...	...	98	...	**90**	...	...	86	...	...	...	...
12	...	...	110	...	108	...	**96**	...	96	...	...	...	...	...
13	...	...	104	94	96	90	**92**	90	98	...	90	...	...	92
14	...	...	102	104	102	**96**	...	...	98	...	...	96	...	...
15	...	...	122	**110**	...	...	...	112	...	...	116	...	...	...
16	...	94	108	...	**96**	...	...	...	...	...	...	...	...	...
17	92	...	...	92	..	92	...	...	...	...	...	...	...	...
18	...	102	**96**	...	...	...	96	...	...	...	...	...	...	...
19	106	104	...	100	**98**	...	...	...	98	...	...	...	...	...
20	...	...	...	102	96	**90**	...	102	...	...	...	...	...	106
21	...	108	112	...	112	...	118	...	...	...	...	...	100	...
22	...	...	...	110	...	**106**	...	...	96	...	...	...	...	...
23	...	...	...	106	...	**96**	...	...	...	100	...	...	...	...
24	...	...	114	...	**102**	...	...	...	...	...	...	...	...	...
25	...	...	110	...	108	104	**102**	...	102	...	...	...	100	...
26	...	116	112	**98**	...	96	...	...	...	...	...	...	96	...
27	...	112	110	110	102	100	...	110	98	112	108	...	...	...
28	...	...	106	116	110	102	88	...	120	...	...	...	...	...
29	...	106	...	**94**	...	...	100	...	...	...	...	...	...	...
30	...	...	...	112	110	94	**94**	...	...	94	...	...	...	...
31	...	...	110	108	96	**90**	...	92	...	96	...	...	100	...
32	...	...	114	106	**96**	...	92	...	...	...	96	...	...	...
33	...	...	...	...	96	**80**	...	...	82	...	80	...	86	...
34	...	...	...	120	116	...	**96**	...	104	...	...	...	108	...
35	...	94	96	96	92	...	96	...	...	88	...	...	...	...
36	126	120	...	124	...	...	124	...	...	...	...	...	...	...
37	...	...	...	104	96	**96**	...	96	...	...	92	...	...	...
38	...	...	116	**100**	...	96	...	...	...	...	...	...	...	...
39	...	100	...	100	...	104	...	...	...	...	...	...	...	...
40	...	118	...	**94**	...	94	...	...	...	...	...	...	100	...
41	...	...	...	...	...	110	**100**	...	...	...	...	100	...	100
42	...	...	110	...	110	104	...	104	...	...	...	100	...	...
43	...	122	116	114	...	102	**102**	...	...	...	...	...	...	110
44	...	...	106	100	...	...	100	**94**	...	...	...	...	94	...
45	...	...	118	114	**100**	...	112	...	...	116	...	...	...	...
46	...	...	...	...	100	...	110	...	100	**90**	...	90	...	90
47	...	116	...	**116**	...	...	116	...	...	...	120	...	...	...
48	...	...	...	...	110	106	...	**98**	...	100	...	...	...	...
49	...	...	...	...	96	94	...	106	98	106	100	...	...	...
50	108	...	96	98	92	**80**	82	...	...	90	...	92	...	...
51	118	116	112	...	**90**	...	90	...	88	...	...	...	...	...
52	...	...	106	**90**	88	...	88	...	90	...	...	...	...	...

The figures in boldface type are for the day of the crisis.

the blood pressure curve during the acute phase of the disease, with a sharp drop at the time of the crisis. During the postcritical period the pressure after a slight rise remained stationary, and in the period of convalescence rose slightly.

Since age is a factor in variations in the blood pressure, the patients were classified by age as shown in table 2. From this table it is seen that, irrespective of age (in the last group the cases are too few to make the observation significant), the level of the blood pressure curve was higher before the crisis than after the crisis.

In four patients there was a precritical drop in temperature, accompanied by a sharp fall in blood pressure, the low level of pressure being maintained after the crisis. Further comment regarding these cases will be made subsequently.

TABLE 2.—*Systolic Blood Pressure in Children with Pneumonia Before and After the Crisis, Grouped According to Age*

Age, Yr.	Number of Cases	Average Systolic Pressure, Mm. Hg	
		Before Crisis	After Crisis
Less than 3	10	104	93
3- 5	15	106	95
6- 8	18	109	99
9-11	4	115	114

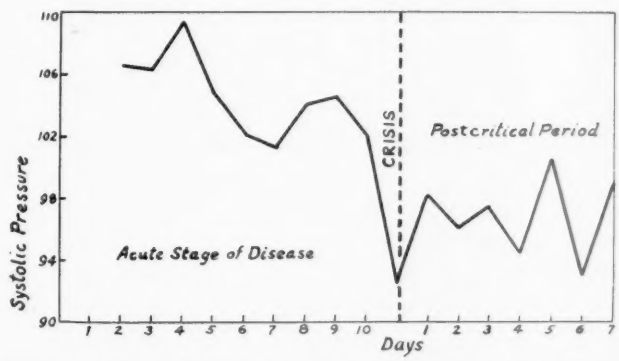

Chart 1.—Average systolic blood pressure in children recovering from pneumonia, during the acute stage of the disease and during the postcritical period. This chart and the others were constructed by plotting the observations for each patient for each day of the acute stage of the disease and also for each day after the crisis. The average or arithmetical mean was then calculated for each day, and from the figures so obtained the curve was drawn. The values for the mean and the median were found to be approximately the same.

It is of interest to note that of four of the patients who died, one had a range of blood pressure of from 112 to 108; a second, from 106 to 88; a third, from 96 to 88 and a fourth, from 106 to 100. The fifth patient who died was in the hospital for only twelve hours. A short time (twenty-four hours or less) before death the systolic and diastolic pressures for the patients were, respectively, 108 and 60, 120 and 74,

88 and 60, 100 and ?, and 98 and 70. If it be true that grave symptoms and death in pneumonia are caused by failure of the vasomotor apparatus, the blood pressure curve in such cases ought to be strikingly below the normal and to fall still lower as the severity of the vasomotor disturbance increases. From the figures given for the blood pressure curve in the five fatal cases in this study and from similar figures recorded by Weigert, Newburgh and Minot, and Perry, there is no suggestion of a failure of the vasomotor center.

The impression gained from observing the patients whose cases are presented in this report is that a definite drop in blood pressure occurred just before or immediately after the crisis. This change may be seen best in chart 1, from which two facts are evident: (1) that the blood pressure is definitely higher during the acute stage of the disease than it is after the crisis and (2) that a gradual decline takes place in the systolic pressure during the course of the disease.[13]

RESPONSE TO EPINEPHRINE

The reaction of the small vessels of the skin to epinephrine was tested (according to the method of Lewis and of Perry) by making a light prick through a drop of solution of epinephrine on the flexor surface of the forearm. This produced a definite blanching of the skin in two minutes. With the armlet of a sphygmomanometer in place, the pressure was gradually raised 5 mm. at a time, each pressure being maintained for one minute, until the lowest pressure necessary to obliterate the blanching was obtained. In every instance in which such blanching was abolished by back pressure, the blanching returned on releasing the pressure. Lewis has shown that in this way the pressure in the veins can be raised to, or to slightly below, the pressure recorded by the sphygmomanometer; presumably the same, or a little higher, pressure is present in the capillaries under such circumstances. Lewis [14] and Perry [4] also have shown that in normal subjects the small vessels which contract in response to epinephrine are able to resist distending pressures of as much as from 80 to 100 mm. of mercury.

Immediately after determination of the blood pressure, the response to epinephrine puncture was tested. This procedure was repeated at

13. I have not commented on the variations in the diastolic pressure because I have felt that little reliance could be placed on the readings obtained in the younger children. Stocks and Karn also found difficulty in reading diastolic pressures in children under 7 years of age in a very large group which they studied. Stocks, P., and Karn, M. N.: Blood Pressure in Early Life: A Statistical Study, Studies in National Deterioration, no. 11, Drapers' Company Research Memoirs, London, Cambridge University Press, 1924.

14. Lewis, T.: The Blood Vessels of the Human Skin and Their Responses, London, Shaw & Sons, Ltd., 1927.

During Their Stay in the Hospital
Day of Illness

During Their Stay in the Hospital

Case No.	Age, Yr.	Sex	Day of Illness 2	3	4	5	6	7	8	9	10	11	12	13	14	15	Comment
1	5	M	..	..	40	50	50	50	**70**	70	..	75	..	90	..	90	
2	3	M	..	..	..	..	..	50	50	**60**	..	65	..	65	..	70	
3	4	M	..	..	80	..	**90**	..	..	..	90	..	..	..	..	..	
4	11	F	..	..	..	35	40	..	35	..	40	..	40	..	..	50	Gravely ill; involvement of three lobes; in oxygen chamber for many days; complete recovery
5	5	F	..	..	..	..	60	..	**90**	110	..	..	120	..	..	..	
6	1½	F	..	65	60	80	..	**100**	..	..	..	..	..	..	..	..	
7	6	M	..	60	..	60	..	..	65	..	..	..	80	..	..	..	
8	7	M	50	..	50	55	..	55	55	55	..	..	45	..	**50**	55	Gravely ill; acute otitis media; pleural effusion
9	7	M	..	..	80	70	..	..	**65**	..	..	..	70	..	..	..	
10	5	M	70	80	..	**90**	..	..	110	..	..	..	..	..	..	..	
11	4	M	..	..	..	..	90	..	**90**	..	..	90	..	..	..	..	
12	6	F	..	..	40	..	50	..	**60**	..	60	..	..	..	..	..	
13	3	M	..	..	35	35	40	40	**50**	50	70	..	75	..	..	90	Gravely ill; marked cyanosis; in oxygen chamber for several days; complete recovery
14	6	F	..	..	50	35	40	**45**	..	..	60	..	..	65	..	..	Toxic; bilateral acute otitis media; in oxygen chamber several days
15	11½	F	..	..	75	**75**	..	..	..	85	..	..	120	..	..	..	
16	2	F	..	40	50	..	**70**	..	..	..	..	..	..	..	..	..	
17	2½	F	40	..	..	50	..	60	..	..	..	..	..	..	..	..	
18	7	F	..	60	**70**	..	..	..	85	..	..	..	..	..	..	..	
19	5	M	70	70	..	75	**85**	..	..	..	100	..	..	..	..	..	
20	8	F	..	..	..	35	45	**60**	..	75	..	..	..	..	..	75	Gravely ill; prognosis doubtful for several days
21	2	M	..	40	35	..	40	..	45	..	..	..	..	..	75	..	
22	5	F	..	..	..	50	..	**60**	..	..	75	..	..	..	..	..	
23	7	F	..	..	..	35	..	**45**	..	..	..	50	..	..	..	..	Gravely ill; symptoms manifested in central nervous system
24	4	M	..	..	35	..	**45**	..	..	..	..	..	..	..	..	..	
25	7	M	..	..	55	..	40	45	**55**	..	65	..	..	..	70	..	Gravely ill; symptoms manifested in central nervous system
26	9	M	..	50	50	**60**	..	70	..	..	..	..	..	..	120	..	
27	3	F	..	40	50	50	50	55	..	60	50	40	45	..	..	..	Toxic; involvement of three lobes; empyema; death
28	2½	F	..	..	45	35	35	45	50	..	40	..	..	..	..	..	Involvement of entire left side; seemed better on eighth day; died suddenly on tenth day
29	7	M	..	50	..	**60**	..	..	90	..	..	..	..	..	..	..	
30	4½	M	..	..	..	40	50	60	**65**	..	..	70	..	..	..	..	
31	6½	M	..	..	50	50	55	**65**	..	70	..	75	..	..	75	..	
32	7½	M	..	..	45	50	**60**	..	70	..	..	..	75	..	..	..	
33	3	F	..	..	..	..	55	**65**	..	..	65	..	70	..	75	..	
34	7	M	..	..	..	40	50	..	**60**	..	65	..	..	..	75	..	
35	1½	F	..	35	40	40	45	..	45	..	..	50	..	..	..	..	Gravely ill for five days; empyema and acute otitis media; seemed better on eleventh day; pneumothorax developed, followed by sudden death
36	10	F	55	70	..	120	..	..	120	..	..	..	..	..	..	..	
37	4½	F	..	..	..	40	45	**55**	..	65	..	..	70	..	..	..	
38	9	F	..	..	50	**60**	..	80	..	..	..	..	..	..	..	..	
39	5½	F	..	50	..	60	..	70	..	..	..	..	..	..	..	..	
40	5	M	..	35	..	**50**	..	60	..	..	..	..	..	..	80	..	
41	2	M	..	..	..	..	..	40	**55**	..	..	..	..	70	..	70	
42	1	M	..	..	..	..	..	40	**50**	..	..	..	..	60	..	60	Gravely ill; bilateral acute otitis media; good recovery
43	7	M	..	40	50	50	..	55	**65**	..	..	..	..	..	..	80	
44	4	M	..	..	55	60	..	..	65	**75**	..	..	..	..	80	..	
45	8	M	..	..	70	60	**75**	..	95	..	..	95	..	..	..	..	
46	2	F	..	..	..	..	45	..	40	..	45	**60**	..	60	..	70	Involvement of entire right side; marked cyanosis
47	10	M	..	80	..	**90**	..	..	100	..	..	..	90	..	..	..	
48	2	M	..	..	..	..	75	70	..	**55**	..	55	..	..	..	..	
49	1½	F	..	..	..	..	60	60	..	55	55	30	25	..	..	..	Gravely ill; involvement of entire right side; progressive downward course; death
50	9	M	60	..	50	50	..	**50**	55	..	..	60	..	60	..	..	Gravely ill; symptoms manifested in central nervous system; comatose two days; good recovery
51	9	M	50	70	70	..	**75**	..	120	..	120	..	..	..	..	..	
52	6	F	..	..	50	**65**	80	..	80	..	120	..	..	..	..	..	

The figures in boldface type are for the day of the crisis.

twenty-four hour intervals (whenever possible) during the acute stage of the pneumonia and then at two to three day intervals after the crisis. A résumé of the results is shown in table 3. The findings in this table can be summarized by the statement that in 92 per cent of the patients who recovered the congesting pressure required to obliterate the blanching produced by epinephrine varied from 70 to 35 mm. of mercury until the day of the crisis or the preceding day, after which the necessary pressure rose rapidly, until in from five to twenty-one days the contracted vessels were able to withstand pressures of from 80 to 120 mm. of mercury. This is represented graphically in chart 2.

In only 6 per cent of the patients in whom the symptoms were mild did the blanched skin withstand back pressures of 75 mm. of mercury or more throughout the course of the disease; in one patient the back

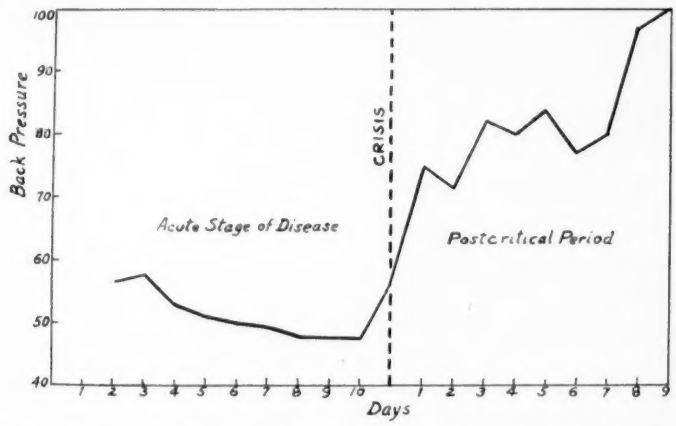

Chart 2.—Average back pressure necessary to obliterate blanching produced by epinephrine in children recovering from pneumonia, during the acute stage of the disease and during the postcritical period.

pressure decreased throughout the disease (a mild attack). In three of the children, when recovery was complete the effect of the ephinephrine could not be overcome with the patient's systolic pressure.

The response to epinephrine manifested by the children with fatal attacks (cases 27, 28, 35 and 49) can be seen from table 3. Unfortunately it was not possible to observe all of them to the end because of the intervention of surgical complications (pneumothorax). The response to epinephrine for the patients who died is shown in chart 3, in which is indicated a decrease in the back pressure required to obliterate the blanching as the degree of toxemia increased.

These findings are in agreement with those of Perry with but one exception. Whereas he found that the resistance of the contracted

vessels did not return to normal in less than fourteen days after the crisis, a return to normal was observed in my patients as early as the third day after the crisis and occurred on the average nine days after.

It is of interest to note at this point that in the four patients in whom there was a precritical drop in temperature it was accompanied by both a sharp fall in blood pressure and an increase in the back pressure necessary for obliterating the blanching produced by epinephrine puncture. In all of these patients this triad was an omen of good prognosis, even though no noticeable symptomatic improvement accompanied it.

REPORT OF CASES

The following case is cited to illustrate the gradual increase in the resistance of the contracted vessels in response to epinephrine puncture.

Geraldine S., aged 11 years, was admitted to the hospital on November 14. She had a history of headache, abdominal pain and fever for the past five days. Her appearance was toxic and cyanotic and her temperature 104 F. There were

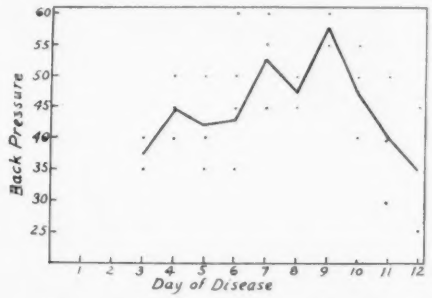

Chart 3.—Average back pressure necessary to obliterate blanching produced by epinephrine in children suffering fatal attacks of pneumonia. The dots represent individual observations and the solid lines the average.

signs of consolidation in the lower lobe of the left lung. The child was placed in an oxygen tent. At this time the blood pressure was 100 systolic and 60 diastolic, and the blanching produced by epinephrine was obliterated by pressure of 35 mm. of mercury. For the next two weeks the child was desperately ill. The lesion spread to the upper lobe of the left lung and then to the lower lobe of the right lung. The pressures required for abolishing blanching on November 16, 18, 21, 24 and 28 were 30, 35, 40, 40 and 50 mm. of mercury, respectively. On December 1 the child appeared distinctly better (her temperature was 99 F.), and from that time to the day of her discharge from the hospital, December 22, the pressure required to eliminate blanching steadily increased, as follows: 50, 60, 70, 70, 85 and 90 mm. of mercury.

The following fatal case is cited to illustrate the steady decline in the resistance of the contracted vessels in response to epinephrine puncture.

Sheila G., aged 15 months, was operated on for mastoiditis on April 16. On April 25, after being normal for three days, the temperature became elevated,

and on April 27 signs suggestive of pneumonia were noted in the lower lobe of the right lung. On April 28 the signs were more definite. The child was placed in an oxygen tent and appeared fairly comfortable. On May 1 her temperature was 104 F. and her blood pressure 96 systolic and 56 diastolic. The blanching produced by epinephrine was obliterated by a pressure of 60 mm. of mercury. The child's color was good. On May 2 she seemed comfortable, and her color was good. The blood pressure was 94 systolic and 60 diastolic. The pressure required to obliterate blanching was 60 mm. of mercury. On May 4 there was extension of the lesion to the middle lobe of the right lung. The child was more toxic. The blood pressure was 106 systolic and 64 diastolic, and the pressure necessary to abolish blanching was 55 mm. of mercury. On May 5 the blood pressure was 98 systolic, and the pressure required to obliterate blanching was 55 mm. of mercury. On May 6 the child was extremely sick and cyanotic. The blood pressure was 106 systolic and 62 diastolic, and the pressure required to eliminate blanching was 35 mm. of mercury. Six hours later the blood pressure was 100 systolic, and the pressure necessary to abolish blanching was 25 mm. of mercury. On May 7, the girl was extremely sick and showed marked cyanosis. Blanching of the skin could not be produced by means of epinephrine puncture. Death occurred eight hours later.

The patients in this series may be divided roughly into four groups according to the back pressure which was necessary to obliterate the blanching produced by the injection of epinephrine at the height of the disease. The groups are as follows:

1. Patients in whom the blanching produced by epinephrine was obliterated by a back pressure of 30 mm. of mercury or less. There were two such patients, both of whom died.

2. Those in whom a back pressure of 35 to 40 mm. of mercury was required to abolish the blanching produced by epinephrine. Among these children were ten with the most severe attacks and three who died.

3. Those in whom a back pressure of 45 to 70 mm. of mercury was required. This group consisted of thirty-four patients suffering moderately severe attacks.

4. Those cases in which throughout the disease the blanching produced by epinephrine withstood back pressures of 80 mm. of mercury or more. The children with the mildest attacks fell into this group, a total of three.

We thus find, as did Perry, a close correlation between the degree of toxemia and the ease with which blanching produced by epinephrine can be obliterated by back pressure. The greater the toxemia, the less the back pressure required.

COMMENT

The blood pressure findings reported in this study of children and the observations reported by other investigators in regard to blood pressure in adults indicate that a fall in such pressure is not the essential feature of the circulatory failure in lobar pneumonia. The rise in

systolic pressure noted during the height of the disease may be part of the usual mechanism for combating acute infections. As regards the behavior of the peripheral circulation, Perry wrote:

> The response of the vessels of the skin . . . to adrenalin [epinephrine] would appear to indicate that the contractile power of the minute blood-vessels is definitely impaired in lobar pneumonia. . . . It would appear that this impairment of the efficiency of the capillaries is due to some circulatory toxin. The increased intensity of the skin colour noted in the majority of the patients may be another manifestation of the same toxin producing a dilatation of the skin capillaries. The rapid return of the skin colour to normal after the crisis would appear to argue that the toxin production ceased with, or was efficiently neutralized after, the crisis.

Romberg and Paessler [15] showed that the functional capacity of the heart was not materially changed in severe experimental infections but claimed that the circulatory failure was due to a poisoning of the vasomotor centers in the medulla. Since then it has been shown that there is no such loss of vasomotor tone. The essential factors are a decrease in the circulating volume of blood due to stasis in the depot or storage areas (the liver, the splanchnic area and the subpapillary capillary plexus in the skin) and a transudation into the tissues as the result of the increase in permeability of the capillaries. In a study of myocardial efficiency in experimental cases Newburgh and Porter [16a] concluded that the cardiac muscle is not functionally impaired in pneumonia and that it adapts itself well to the altered toxic blood with which it is supplied.

In acute myocardial failure one of the most constant and serious findings is a fall in pulse pressure. In pneumonia, however, as shown by Perry and in most of the cases in this study, there is rather a tendency to a rise in this pressure. This observation is confirmed also by experimental work.

In various studies, electrocardiographic and histologic, of the heart in pneumonia, serious myocardial changes have been noted infrequently. Warfield [16] tersely summarized the matter when he wrote:

> Is it conceivable that an organ with such a reserve power as the heart has, an organ that, given oxygen and dextrose and insulin, can beat almost indefinitely outside the body, an organ that beats from before birth to old age, is likely to fail within a few days or weeks? Isn't it much more probable that the explanation for the so-called failing heart is to be found elsewhere than in the heart itself?

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15. Romberg, E., and Paessler, H.: Untersuchung über die allgemeine Pathologie und Therapie der Kreislaufstörung bei akute Infektions Krankheiten, Arch. f. klin. Med. **64**:652, 1899.

16. Warfield, L. M.: The Treatment of Circulatory Failure, J. A. M. A. **106**: 892 (March 14) 1936.

16a. Newburgh, L. H., and Porter, W. T.: The Heart Muscles in Pneumonia, J. Exper. Med. **22**:123, 1915.

Henderson [17] maintained that, besides the heart and the vasomotor mechanism, there is a third major factor in the circulation. It is that which sends the blood back to the heart through the veins, which he called the venopressor mechanism. He stated:

> So long as the tissues of the body have tonus, elasticity, and an internal pressure, a part of the force imparted to the blood by the heart is retained by the blood in the vessels within and beneath the muscles. It is this force—in addition to the tonus of the capillaries—that presses the blood on into the veins and thus supplies the right heart and supports the circulation. On the other hand, when muscle tonus is depressed or fails, the entire force of arterial pressure is lost in the flaccid tissues and the blood stagnates there, instead of flowing on through the veins back to the heart.

Since adequate venous return flow, which produces diastolic filling, is absolutely essential for proper cardiac contraction, it follows that when the histamine-like substances formed in severe infections produce marked dilatation of the capillaries much blood will be held out of the circulation. Further, the toxic products of bacterial action on tissue cells cause increased permeability of the capillaries, so that fluid exudes into the tissues and because of stasis is not reabsorbed.

Kastlin and Maclachlan [18] investigated the venous pressure in patients with lobar pneumonia. This pressure was definitely high in thirty-four patients, twenty-four of whom died. Of the thirty-seven with venous pressures within normal limits throughout the illness, only five died. Kastlin and Maclachlan concluded that an increase of the venous pressure is of value in lobar pneumonia in aiding the recognition of circulatory failure and that the degree of this failure is best estimated by a correlation of the venous pressure and the pulse rate.

We thus note from the reports in the literature that in the majority of cases of lobar pneumonia both the vasomotor center and the myocardium suffer little damage and yet the patient dies of circulatory failure. Ritchie's suggestion that this circulatory failure in lobar pneumonia is really a failure of the circulation at the periphery received considerable support from the observations of Perry, and the latter's results have been corroborated by me in this study of children. "If this [Ritchie's] theory be accepted," said Perry, "it has obvious bearings on the appropriate treatment to be adopted, since efforts to stimulate, and improve the tone of the minute blood-vessels are more likely to benefit the patient than attempts to increase the efficiency of the heart itself."

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17. Henderson, Y.: Depression of Muscle Tonus as the Cause of Atelectasis, Failure of the Circulation, and Other Post-Operative Sequelae, Lancet **2**:178, 1935.

18. Kastlin, G. J., and Maclachlan, W. W. G.: Venous Pressure in Pneumonia, Ann. Int. Med. **4**:959, 1931.

It is perhaps premature to speak of epinephrine puncture as of definite prognostic aid. However, in nearly all of the cases it was a fairly reliable indicator of the outcome of the disease. In ten of the more serious attacks, during which from the clinical standpoint the outlook was much in doubt, a back pressure of 35 to 40 mm. of mercury was necessary to obliterate the blanching of the patient's skin, which result is thus seen to check closely with the clinical impression of a poor prognosis. In two children for whom the prognosis was stated to be bad, high back pressures were required to abolish the blanching, and each of the children made a good recovery. Mention also should be made of the four children in whom were noted a fall in blood pressure, an increase in the back pressure necessary for obliterating the blanching caused by epinephrine, and a precritical drop in temperature. In these children, although they did not manifest any noticeable symptomatic improvement, high back pressures were required to eliminate the blanching, and on the next day after epinephrine puncture was made came the crisis and recovery. Certainly more extensive studies are needed before this test can be of use in making a definite prognosis.

SUMMARY AND CONCLUSIONS

Factors concerned with circulatory failure in lobar pneumonia, namely, the blood pressure and the reactions of the small blood vessels of the skin, were studied in a group of fifty-two children who had pneumonia. The blood pressure was found to be raised during the acute stage of the disease, definitely lowered at the time of the crisis and increased again during convalescence. In none of the patients who died was there any significant fall in blood pressure during the course of the disease nor toward the end.

The reactions of the small vessels of the skin showed an impaired efficiency at the height of the disease in the contractility of the capillaries, which returned to normal in a short period after the crisis in those patients who recovered. In the patients who died, however, this impairment of the ability of the capillaries to contract became greater and continued to the time of death.

EFFECT OF CARBOHYDRATE ON CERTAIN FACTORS IN FATIGUE

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ELEANOR BLISH, S.B.
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Fatigue and tendencies to fatigue reactions in an organism are believed to be largely conditioned by the nutritional state. Dill, Edwards and Talbott [1] have stated that the supply of fuel to the organism is one of the more important limiting factors of fatigue.

In order to determine such an effect a study of the changes in the acid base balance and in the sugar content of the blood after exercise was carried out on sixteen children between the ages of 8 and 13 years. The effects of exercise on these changes were observed in the fasting state and after the ingestion of various sugars, principally dextrose and levulose.

The changes in the sugar content of the blood brought about by exercise, with or without the ingestion of sugar, the effects of the respiratory quotient and the concurrent changes in the acid-base balance have been studied in human adults and other mammals and have been reported on by many investigators. The concentration of sugar in the blood during exercise is reported by some authors [2] to show an increase and by others [3] a definite decrease. Edwards, Margaria and Dill [4] found that "when exercise is carried on for many hours without emotional stress, the value of blood sugar may not vary much from the

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1. Dill, D. B.; Edwards, H. T., and Talbott, J. H.: Muscular Activity: VII. Factors Limiting the Capacity for Work, J. Physiol. **5**:49 (Dec.) 1932.

2. (*a*) Goldberg, A. P.; Lepskaja, M. W., and Michlin, M. S.: Zusammenhang zwischen Dauer und Tempo der dosierten dynamischen Arbeit und den Veränderungen des Stoffwechsels, Ztschr. f. d. ges. exper. Med. **85**:211, 1932. (*b*) Christiansen, E. H.: Contributions to the Physiology of Severe Muscular Work, Arbeitsphysiol. **4**:128, 1931. (*c*) Solandt, O. M., and Ferguson, G. C.: The Effect of Strenuous Exercise of Short Duration upon the Sugar Content of the Blood, Tr. Roy. Soc. Canada **26**:173, 1932.

3. Dische, Z., and Goldhammer, H.: Ueber die Wirkung verschiedener Kohlenhydratgaben auf den Blutzucker und Blutphosphor bei Muskelarbeit, Biochem. Ztschr. **247**:8, 1932.

4. Edwards, H. T.; Margaria, R., and Dill, D. B.: Metabolic Rate, Blood Sugar and Utilization of Carbohydrate, Am. J. Physiol. **108**:203 (April) 1934.

resting level until a terminal hyperglycemia develops." Increased concentration of the sugar during exercise has been reported in athletes during Olympic games, marathons and crew races. Some investigators [5] have stated the belief that no relation exists between the sugar content of the blood and the muscular performance and have observed that exhaustion can occur when the glycemic level is high. Changes in the sugar level have been observed after exercise of varying intensity and duration, and observations reported indicate that the glycemic level is somewhat dependent on the intensity of the exercise,[6] the length of time of work [7] or both and that the decrease in the sugar content during work is conditioned by the glycogen storage.[8]

Lactic acid as a factor in fatigue has been widely studied, and its production during exercise, with a concurrent fall in the p_H, has been observed by many. Barr and Himwich [9] attributed the decrease in the carbon dioxide capacity to the production of lactic acid. Dill [10] observed that an increase in the lactic acid content approximated the fall in the bicarbonate content. Campos, Cannon, Lundin and Walker,[5] after working on dogs, stated the opinion that the accumulation of lactic acid is not the cause of exhaustion, because they found that the concentration of lactic acid was highest early in the period of exercise and that it decreased as work continued. No increase in the lactic acid content or loss in the carbon dioxide-combining power with moderate exercise was reported by Owles.[11] The findings of Schlutz, Hastings and Morse,[12] working on dogs, showed invariably a rise in the lactate content after fifteen minutes of exercise, with a subsequent tendency to return to the initial value.

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5. Campos, F. A. deM.; Cannon, W. B.; Lundin, H., and Walker, T. T.: Some Conditions Affecting the Capacity for Prolonged Muscular Work, Am. J. Physiol. **87**:680, 1929.

6. Goldberg, Lepskaja and Michlin.[2a] Campos, Cannon, Lundin and Walker.[5]

7. Strandell, B.: On the Influence of Exercise on Blood Sugar, Especially in Connection with Glucose Ingestion, Acta med. Scandinav., supp. 55, 1934, p. 1.

8. Hiramatsu, T.: Ein Beitrag zur Kenntnis des Kohlenhydratstoffwechels, Biochem. Ztschr. **255**:295, 1932. Christiansen.[2b]

9. Barr, D. P., and Himwich, H. E.: Studies in the Physiology of Muscular Exercise, J. Biol. Chem. **55**:495, 1923.

10. Dill, D. B.; Talbott, J. H., and Edwards, H. T.: The Carbon Dioxide Equilibrium in Alveolar Air and Arterial Blood: II. Resting Subjects; III. Exercising Subjects, J. Biol. Chem. **74**:303, 1927.

11. Owles, W. H.: Alterations in Lactic Acid Content of Blood as Result of Light Exercise and Associated Changes in CO_2 Combining Power of Blood and in Alveolar CO_2 Pressure, J. Physiol. **69**:214 (April) 1930.

12. Schlutz, F. W.; Morse, Minerva, and Hastings, A. B.: Acidosis as a Factor of Fatigue in Dogs, Am. J. Physiol. **113**:595 (Nov.) 1935.

The importance of training as a factor in the interpretation of changes in the blood during exercise is significant and must be considered. Several investigators have shown that hyperglycemia due to exercise decreases with training.[2a] Others [13] have reported that strenuous exercise of short duration leads to a higher sugar content in a trained subject and a lower sugar content in an untrained subject. Meythaler and Droste [14] observed a prolonged return to normal in untrained subjects in whom hyperglycemia was produced with exercise.

The effect of training on the production of lactic acid during exercise and the conditions influencing its removal by oxidation have been the subject of much investigation. Hastings [15] has said that he considers the lowering of the bicarbonate level with exercise to be (within certain limits) a function of the rate of fatigue. Dill [16] reported that the extent of the changes in the lactate and bicarbonate content of the blood indicates the mechanical efficiency of the subject, and in a later publication with Edwards and Margaria [17] he stated that the oxygen debt is due to delayed oxidation of lactic acid and that training makes for quicker recovery than in an untrained subject.

Vladimirov, Dmitriev and Urinson [18] have shown that the lactic acid content during rest is not influenced by previous training but that after strenuous work the concentration of lactic acid and carbon dioxide in the blood depends on previous training. They found that an increase in the duration of exercise did not increase the lactic acid or carbon dioxide content. During recovery hypolactemia was often found. Reports of the work of many investigators on the increase in oxygen utilization with training have been reviewed by Steinhaus [19] in his article entitled "Chronic Effects of Exercise."

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13. Knoll, W., and Lüss, J.: Blutzuckeruntersuchungen an Sportsleuten, Arbeitsphysiol. **7**:517, 1934.

14. Meythaler, F., and Droste, A.: Blutzuckeruntersuchungen bei leichtathletischen Sportarten, Klin. Wchnschr. **13**:439, 1934.

15. Hastings, A. B.: An Investigation of Changes in the Blood and Urine Resulting from Fatigue, Pub. Health Rep. **34**:1682, 1919.

16. Dill, D. B.; Talbott, J. H., and Edwards, H. T.: Studies in Muscular Activity: Response of Several Individuals to Fixed Task, J. Physiol. **69**:267 (May) 1930.

17. Edwards, H. T.; Margaria, R., and Dill, D. B.: Removal of Lactic Acid After Exercise, J. Biol. Chem. **100**:38 (May) 1933.

18. Vladimirov, G. E.; Dmitriev, G. A., and Urinson, A. P.: Effect of Dosed Muscular Exercise on the Lactic Acid and Carbon Dioxide Capacity of the Blood, Fiziol. zhur. **16**:139, 1933.

19. Steinhaus, A.: Chronic Effects of Exercise, Physiol. Rev. **13**:103 (Jan.) 1933.

EXPERIMENTAL METHOD

In this study of the changes in the acid-base balance and in the sugar content of the blood of children during and after exercise, we have tried to ascertain not only the changes due to the exercise itself but the effect of the ingestion of carbohydrate on these changes. The children used as subjects were of either a normal or an asthenic type and had been admitted to the hospital for orthopedic treatment or because of malnutrition—several returned for the exercise experiments after having been discharged.

Experiments were carried out in most cases in the morning, the subject having fasted since the previous evening meal. The exercise consisted of riding a stationary bicycle ergometer.[20] The work was standardized as far as possible for each subject with regard to the average room temperature and the clothing worn. A short period of training of at least one practice "ride" and usually two was allowed, when time permitted, before each series of experiments. The work was calculated in watt hours from the voltage records obtained during the riding and the "output" calibrations of the bicycle ergometer.

Samples were drawn before exercise, after fifteen minutes, after thirty minutes, at the time of exhaustion and at the time of recovery, twenty or thirty minutes after exercise. The blood was collected by puncture of the finger-tip in oxalated sealed funnels under oil.

Duplicate determinations of the acid-base balance were made in the course of each experiment by the microtechnic of Shock and Hastings,[21] which requires only 0.1 cc. of blood for a determination of the p_H of the serum, the carbon dioxide content of the whole blood and the cell volume. One-tenth cubic centimeter of blood was diluted in the Shock-Hastings pipet with adjusted indicator solution to 2 cc. and was centrifugated at 2,000 revolutions per minute for twenty minutes. The cell volume and the p_H were then read (Hastings and Sendroy standard[22]). The entire solution was analyzed for its carbon dioxide content by the gasometric method of Van Slyke, and a blank determination was made on 2 cc. of the indicator solution. The sugar content was determined in duplicate by the micromethod of Folin on 0.1 cc. of blood.

From the results of the determinations of the p_H at 38 C., the hematocrit value and the carbon dioxide content of the whole blood, the value of the carbon dioxide of the serum was determined by factor (Peters and Van Slyke[23]). This value was used in the Hasselbalch equation for calculation of the carbonic acid content, the bicarbonate content and the carbon dioxide tension (by constant factor).

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20. The recording electrodynamic brake bicycle ergometer was designed by L. E. A. Kelso and Dr. F. A. Hellebrandt, of the University of Wisconsin.

21. Shock, N., and Hastings, A. B.: Studies of Acid-Base Balance of Blood: Microtechnique for Determination of Acid-Base Balance of Blood, J. Biol. Chem. **104**:565, 1934.

22. Hastings, A. Baird, and Sendroy, T., Jr.: I. Studies of Gas and Electrolyte Equilibria in Blood; II. Effect of Carbon Monoxide on the Acidity of Hemoglobin, J. Biol. Chem. **61**:317, 1924.

23. Peters, J. P., and Van Slyke, D. D.: Quantitative Clinical Chemistry, Philadelphia, Williams & Wilkins Company, 1932, vol. 2, p. 287.

Changes in the acid-base balance were studied from the fixed acid content as calculated from these values for bicarbonate and p_H. Using the formula $\frac{-\Delta\ HCO_3}{\Delta\ p_H} = 28$, each succeeding value for bicarbonate was converted to the initial p_H. Subtracting this corrected value from the initial bicarbonate value gave the difference in anions in millimols, represented in our charts by Δ A.

The results for both the acid-base balance and the sugar content of the blood obtained during exercise, with and without the ingestion of sugar, are compared with results obtained under similar conditions and intervals without exercise.

In these experiments an attempt was made to determine (1) the response to exercise in the fasting condition by observing changes in the acid-base balance and in the sugar content of the blood, (2) the influence of the ingestion of various sugars on these changes and (3) the difference in the performance and response of the asthenic child as compared with those of the normal child.

The sugar given in the first series of experiments was dextrose.[24] In most cases 2 Gm. per kilogram of body weight was given in about 250 cc. of lemonade immediately after the first sample of blood was taken and just as exercise was begun.

OBSERVATIONS

In this series fourteen of sixteen subjects exercising in the fasting condition showed entrance of fixed acid after fifteen minutes of exercise, and in the same subjects the level of fixed acid fell on exhaustion, in some instances below the preexercise level. In others it showed a definite decrease from the value at fifteen minutes. These findings are in agreement with those of Schlutz and Morse [12] and Campos, Cannon, Lundin and Walker,[5] who observed the same increase in dogs during the early periods of exercise with a fall toward normal as work continued. In most cases the increase in the value of the fixed acid was more marked on the first day than at subsequent experiments. In fact, there was so much compensation through practice that even with increased resistance and longer periods of exercise the value for fixed acid tended to decrease through days of intermittent exercise. The watt hours of work done usually indicated little actual work on the first day of riding, but in spite of this large amounts of fixed acid appeared in the blood, especially in the fasting condition. This rise in the value for fixed acid on the first day of riding appeared even after the ingestion of sugar.

The response of the asthenic child exercising in the fasting condition was not sufficiently unlike that of the normal child as to the amount of fixed acid entering the blood at the fifteen minute period and at exhaustion to separate the two groups on this basis. In an earlier report of this study, mention was made of the greater magnitude of the asthenic child's response to exercise in the production of fixed acid. This was observed in a few isolated cases, but results of further experi-

24. The dextrose used was furnished by the Corn Industries Research Foundation.

ments did not show this difference consistently. Generally speaking, however, the response seemed to be definitely better in the normal child, in that there was a greater average decrease in the value for fixed acid between the fifteen minute peak and the time of exhaustion, showing better oxidation and a more efficient system of regulation. Schlutz, Hastings and Morse,[25] working on dogs, found that changes in the value for fixed acids are in the same direction in the undernourished animal but of greater magnitude. The return to the initial state takes longer in the malnourished animal.

The regulatory mechanism of increased breathing to lower the carbon dioxide tension, thereby keeping the p_H more nearly normal, was noticed in all the subjects showing the rise in the value for fixed acid. After exercise was discontinued and normal breathing was resumed, there was in some instances a rise in the carbon dioxide tension, with a slight fall in the p_H. In any case a rise or fall in the carbon dioxide tension was consistently followed by a fall or rise in the p_H value, respectively. In several of the control experiments without exercise, in which there was no stimulus to increased breathing, the carbon dioxide tension increased and the p_H fell slightly.

Changes in the sugar content of the blood with exercise in the fasting state varied in different subjects and did not show the same change in one subject on different days. In most of the children there was either an increase or no change in the sugar content after fifteen minutes of exercise, and a decrease usually came with prolonged exercise in the fasting condition. No distinction can be made in this connection between the response of the normal child and that of the asthenic child, since there was no uniformity of response in either group. Eleven of the subjects showed some rise in the sugar level during the period of exercise, with no delay in return to normal during the thirty minute period of recovery; five subjects showed no significant change or only a slight decrease during exercise. In an attempt to study in one subject the three or four minute period immediately following exercise, particularly in regard to the continued accumulation of lactic acid, as reported by Margaria and Edwards [26] and E. P. Laug,[27] no change in the value for fixed acid was found during this short period, but a sudden rise occurred in the value for sugar, which returned to normal at

25. Schlutz, F. W.; Hastings, A. B., and Morse, Minerva: Changes in Certain Blood Constituents Produced by Partial Inanition and Muscular Fatigue, Am. J. Physiol. **104**:669 (June) 1933.

26. Margaria, K., and Edwards, H. T.: Removal of Lactic Acid from Body During Recovery from Muscular Exercise, Am. J. Physiol. **107**:681 (March) 1934.

27. Laug, E. P.: Observations on Lactic Acid, Total CO_2 and p_H of Venous Blood During Recovery from Severe Exercise, Am. J. Physiol. **107**:687 (March) 1934.

the end of the recovery period. This tends to indicate that the mechanism for glycogenolysis did not cease operating immediately with the cessation of exercise.

The influence of training, which will be discussed in more detail presently, must not be overlooked in these fasting experiments. The training factor played such an important part in the subjects' response to exercise, as seen in the increase of the value for fixed acid, that the amount of work done was almost predictable from the calculated amounts of fixed acid. During the first few days of the experiment, when the child was unaccustomed to riding, the value for fixed acid showed a definite increase in both fasting and sugar experiments, and in the latter the sugar level rose beyond any succeeding height; but as training began to show its effects, the rise in the level of the fixed acid became less pronounced as the exercise period and the watt hours of work increased. Likewise, in the sugar experiments there was less increase in the sugar content. For this reason comparisons of experiments in the fasting state with those in which sugar was given had to be made by averages or comparisons of successive days when the training factor did not need to be considered. For this reason, also, fasting experiments were alternated with sugar experiments. This was particularly true of the normal, well nourished child, whose response to training was so marked that comparisons of results were almost useless for any other reason than to observe the effects of training.

If continued exercise causes an accumulation of fixed acid, probably lactic acid, due in part to the depletion of the glycogen stores, one should expect to find some restoration of the supply of glycogen after ingestion of either dextrose or levulose (both of which are good glycogen formers) and subsequent removal of lactic acid, provided the oxygen debt has not become great enough to prevent its removal at the normal rate. And so, having observed the tendencies toward increased values for fixed acid produced by exercise in the fasting condition, the effects of carbohydrate ingestion on these changes in the blood during exercise were studied in the same subjects. In some cases the fasting experiment was made first and followed two days later by the sugar experiment. Almost invariably the effect of training magnified the differences to such an extent that it was found best to conduct the sugar experiment first and follow it by the fasting experiment, thereby minimizing the effect due to sugar. In this series 2 Gm. of dextrose per kilogram of body weight was given in about 250 cc. of lemonade after the taking of the first fasting sample (i. e., in the morning before breakfast) and immediately preceding the exercise.

The question has been raised as to whether lemon juice alone will increase the value for fixed acid. An experiment was performed using lemon juice without sugar, and the level of fixed acid rose to beyond

the exercise with fasting level. However, lemon juice is never used alone in these experiments, and the sugar control, consisting of the lemon juice and sugar, as in all the sugar experiments, showed no increase—even some decrease—in the value for fixed acid.

When dextrose was given at the beginning of exercise, six of the sixteen subjects showed that entrance of fixed acid into the blood was inhibited either at the fifteen minute period or at exhaustion. In many instances when no effect of the sugar could be seen by comparing differences in the entrance of fixed acid, there was a more abrupt drop in the value for fixed acid when sugar had been given. Charts 1 and 2 show typical curves of results obtained for a normal child exercising in the fasting condition and after the ingestion of dextrose. In three cases in which sugar was given one-half or one hour before exercise was begun, the entrance of fixed acid was definitely inhibited

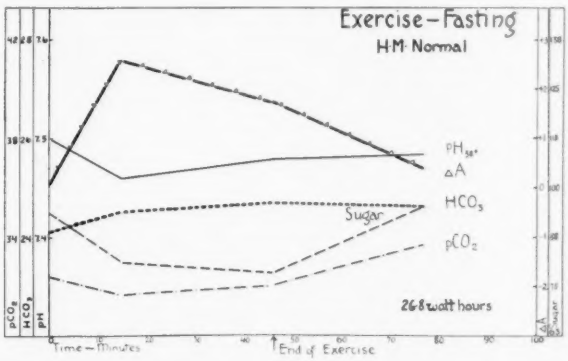

Chart 1.—In this and the following charts the millimols of fixed acid per liter of serum (as calculated from the values for the p_H and bicarbonate) is represented by the Δ and dash line. The sugar in milligrams per hundred cubic centimeters of blood is indicated by the heavy dotted line. The values for p_H are given at 38 C. The bicarbonate in millimols per liter of serum is represented by the dash line. The dot and dash line represents the carbon dioxide tension.

(chart 3). In one subject on whom both types of experiment were performed, the one in which exercise was begun at the peak of the sugar curve showed the greater effect in depressing the level for fixed acid. In the other two subjects who performed both types of experiment, there was no response when sugar was given simultaneously with the commencement of exercise, but when exercise began at the peak of the sugar curve, the level for fixed acid did not rise to the same degree as it did in the fasting condition.

Apparently time is an important factor in the storage of glycogen from the recently ingested dextrose, and the benefits of newly replenished

stores are felt most effectively at the height of the sugar curve. This indicates that the rise in the level for fixed acid in the fasting condition is due to the inadequacy of the glycogen stores and that sugar when stored is able to relieve this piling up of fixed acid. The height of the sugar curve or a point soon after the maximum value is reached seems to be the optimum time for availability of newly stored glycogen.[28]

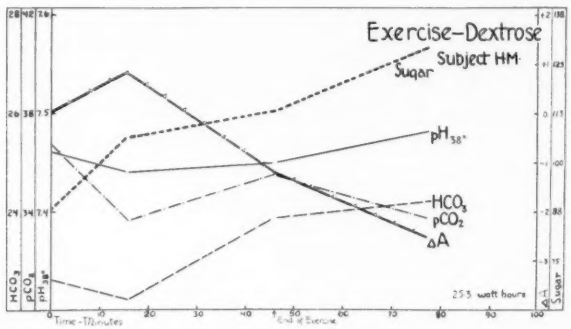

Chart 2.—The effect of the ingestion of dextrose on the acid-base balance in a normal child during exercise.

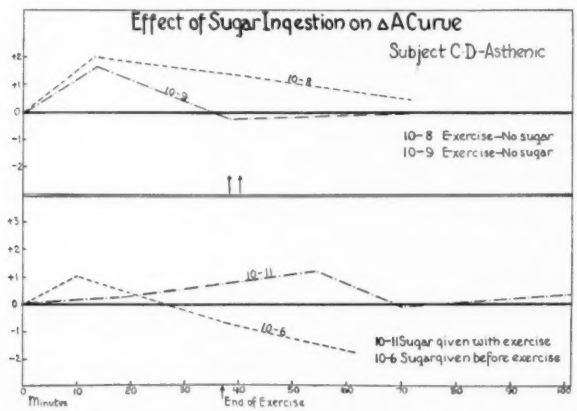

Chart 3.—The upper curves show the increase in the amount of fixed acid in the fasting state and the lower ones the effect of sugar (dextrose) on this curve when given some time before exercise or immediately preceding it. It is seen that in the case in which exercise was begun at the peak of the sugar curve, there was a slight initial rise followed by a marked decrease in the level of the fixed acid, while ingestion of dextrose at the beginning of exercise allowed a gradual and prolonged rise in the level of fixed acid.

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28. Cori, C. F.: Influence of Insulin and Epinephrine on the Fate of Sugar in the Animal Body, in Harvey Lectures, 1927-1928, Baltimore, Williams & Wilkins Company, 1929, p. 76.

The factors of oxygen debt and depletion of glycogen stores are so closely interwoven in the elaborate mechanism of muscle contraction that it is difficult to point out specifically the differences due to one factor or the other. Our results seem to indicate that the factor affected most by the influence of training is the regulatory mechanism of oxygen transport, and for this reason the effects of the ingestion of carbohydrate are often obscured after a few days of training by a more efficient mechanism for the removal of lactic acid.

In all subjects exercise produced a depression in the blood sugar curve (as determined without exercise) either at the fifteen minute period or at exhaustion. Usually the effects of exercise could be observed after fifteen minutes. Samples at the time of recovery showed a rise in the sugar value when the exercise stopped before the sugar content began to return to the fasting level.

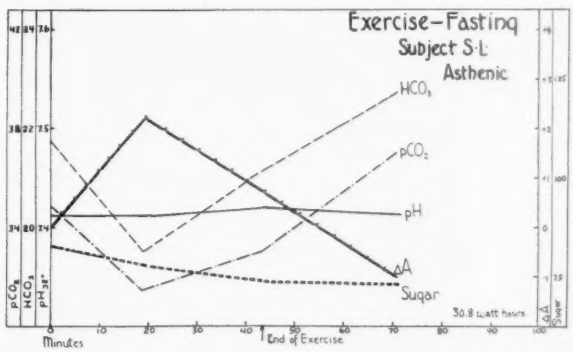

Chart 4.—The typical changes which take place in the blood of an asthenic child during exercise with fasting. The curves suggest a possible magnification in the changes produced in the asthenic child as compared with the changes occurring in the normal child (chart 1).

The ingestion of dextrose without exercise caused a slight decrease in the content of fixed acid in ten of the sixteen subjects. This may be interpreted as the relief to the acidosis of mild starvation so often seen in children.

In comparing the performance of the asthenic child with that of the normal child, significance may be attached to the response of the normal child to training. In the asthenic subjects studied in this series of experiments there was usually a sufficient rise in the content of fixed acid during exercise in the fasting condition to show some inhibition of this increase by the ingestion of dextrose (charts 4 and 5). In the normal child the change in the level of fixed acid due to exercise in the fasting state was so markedly lowered through training that, by comparison with the sugar experiments, no effect could be attributed to the ingestion of sugar.

One underweight child, who was believed to be asthenic, responded to training in the same way as the normal children—no inhibiting effect on the production of fixed acid due to the sugar could be demonstrated. This behavior of the normal child is probably due to the overshadowing of the sugar effect through the increased utilization of oxygen acquired through training.

Increasing amounts of glycogen in the muscle after training have been reported by Embden and Habs [29] and Proctor and Best.[30] Lundsgaard [31] has suggested that it is possible that the highly perfected oxygen transport of the trained subject may provide the conditions necessary for more direct resynthesis of phosphocreatine, "reducing the need for the direct process involving the formation of lactic acid." Christiansen attributed a "circulatory economy" through increased oxygen utilization (with training) to a better peripheral regulation.

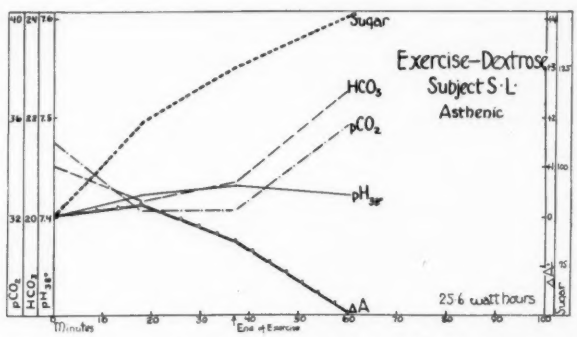

Chart 5.—The response to dextrose in an asthenic child, with an actual decrease in the amount of fixed acid. This graph is to be compared with chart 2 for quantitative differences in the types of response.

The increased ability to store glycogen in the trained subject is seen by comparing experiments made on the first day with those of succeeding days. The "tolerance" to sugar changes as well as the subject's ability to utilize it. This is inferred from the diminishing rise in the sugar curve after a few days of exercise and in the differences observed between the type of curve obtained after the ingestion of sugar with exercise and that of the sugar alone at the same intervals. The uniformity in the depression of the curve with exercise after the ingestion

29. Embden, G., and Habs, H.: Ueber chemische und biologische Veränderungen der Muskulatur nach öfters wiederholter faradischer Reizung, Ztschr. f. physiol. Chem. **171**:16, 1927.

30. Proctor, H. A., and Best, C. H.: Changes in Muscle Glycogen Accompanying Physical Training, Am. J. Physiol. **100**:506, 1932.

31. Lundsgaard, Einar: Weitere Untersuchungen über Muskelkontraktionen ohne Milchsäurebildung, Biochem. Ztschr. **227**:51, 1930.

of any of the sugars studied indicates that utilization of the carbohydrate is increased with exercise and that training further increases the efficiency of this mechanism. A comparison of dextrose with other sugars in this respect is not warranted in this type of study because of the variation in the absorption of sugar. Improved utilization, especially in the normal child, gives evidence that the stimulation due to continued exercise is an important factor in the building up of an efficient mechanism for both glycogen storage and oxygen transport.

The same regulatory effect of increased breathing in lowering the carbon dioxide tension and thereby keeping the p_H constant was observed in the experiments in which sugar was given with exercise. A rise in the carbon dioxide tension was accompanied by a fall in the p_H. At the fifteen minute period there was, as in the fasting experiments, a slight fall in the p_H in the majority of subjects, with a return to normal or above at the time of exhaustion.

In order to compare the influence of other sugars on the changes in the acid-base balance and in the sugar level of the blood during exercise, the same type of experiment was carried out using levulose, lactose and sucrose, 2 Gm. per kilogram of body weight, in lemonade in the same way as dextrose. Levulose, because of the more universal interest in its practical use, was given in a longer series of experiments than either lactose or sucrose.

A comparison of levulose with dextrose is best made by observing the responses in those subjects to whom both sugars were given during a series of experiments.

In one asthenic child who received both sugars there was a slightly better response to levulose after fifteen minutes of exercise. In no one of three other asthenic children was the inhibiting effect of levulose on the rise in the level of fixed acid greater than the response to dextrose. In one of these children dextrose proved more efficient than levulose, and in the others there was a mild response to each of the sugars.

In three normal children who were given both sugars no inhibiting effect on the level of fixed acid could be attributed to the ingestion of levulose, because of the more powerful response to training. In every experiment the effect of increased efficiency so overshadowed any possible effects of the ingestion of sugar that no difference in the responses to the two sugars could be deduced.

It would be difficult to draw conclusions from this series of experiments as to the relative utilization of levulose and dextrose or their efficiency as formers of glycogen. This work has been carried out on rats (Cori, 1927 to 1928 [26]), and the relative absorptions of the sugars have been reported. Generally speaking, levulose, because of its tendency to increase the content of fixed acid in the blood even in the resting

state [32] and its slower intestinal absorption than dextrose, would have to present a striking picture through the means of a study of this kind. When control experiments (without exercise) were carried out for both dextrose and levulose, four of five subjects showed slightly more fixed acid when levulose was given.

Lactose when given at the beginning of exercise seems to have no inhibitory effect on the entrance of fixed acid into the blood at the fifteen minute period or at exhaustion. The carbon dioxide tension rises and the p_H falls at the fifteen minute period or at exhaustion. Lactose when given alone seems to cause a fall in the content of fixed acid at the fifteen minute period, in spite of the fact that the sugar level rises only 14 mg. during this interval. The peak of the curve for sugar without exercise is 21 mg. above the fasting level. Exercise depresses the curve as long as it continues, but a new rise is shown in the sample after recovery. Exercise with lactose shows a lowering of the p_H at the fifteen minute period, with a tendency for it to rise toward exhaustion.

With sucrose the amount of fixed acid entering the blood is definitely in excess of that during fasting at the fifteen minute period. This falls somewhat at exhaustion and approximates the value during fasting. Exercise lowers the sugar level at exhaustion only. It is interesting to note that a subject used for both levulose and sucrose experiments was able to ride longer on three different days with sucrose than with levulose, which permitted about the same period of exercise as fasting. This is the only instance in which the length of time to exhaustion and the watt hours of work done in the fasting state could be compared with the values after the taking of sugar. In all the other series the response to training was sufficient to make any comparisons valueless. The length of time to exhaustion and the watt hours of work done were dependent on the increasing efficiency of the subject in his ability to regulate the mechanisms for oxygen transport and sugar utilization. Since the subject's efficiency increases in the fasting state, improved oxygen transport is certainly the more evident if not the more important factor of the two.

SUMMARY

Fourteen of sixteen subjects who exercised in the fasting condition showed entrance of fixed acid after fifteen minutes of exercise. The

32. Bachmann, G., and Haldi, J.: The Effect of Glucose and Fructose Separately and in Combination on the Respiratory Exchange and Some Urinary Constituents at Rest, Am. J. Physiol. **113**:3 (Sept.) 1935. Ørskov, S. L.: Studies on the Amount of Lactic Acid and of the Total Amount of Ether Soluble Acids in the Blood of Dogs on Different Foods, Skandinav. Arch. f. Physiol., 1932, vol. 63. Sterkin, E., and Wengerowa, F. M.: Studien über Fructose- und Milchsäurestoffwechsel, Biochem. Ztschr. **272**:246, 1934.

response of the asthenic child with regard to the amount of fixed acid produced was not uniformly unlike that of the normal child, but differences were seen in the samples taken at exhaustion, the normal child showing a greater decrease in the value for fixed acid after the peak was reached than did the asthenic child. This tends to indicate a greater improvement in oxygen transport and therefore a quicker response for the delay of fatigue.

When sugar was given just before exercise was begun, six of sixteen children showed that the entrance of fixed acid was inhibited after fifteen minutes or at exhaustion, and in many experiments in which this change was not seen, there was a more abrupt drop in the curve toward exhaustion when sugar had been given. Three of four children who were given sugar one-half or one hour before exercising showed a more rapid effect on the depression of fixed acid than was seen when sugar was given simultaneously with exercise.

Striking differences were found between the normal child's response to training and that of the asthenic child. The normal child's performance improved so markedly with training that any effects due to sugar were insignificant and completely overshadowed.

The ability to store sugar improved with exercise, as indicated by the depressed curve for sugar in the blood during the period of exercise. Training further increases the efficiency of the mechanism for glycogen storage as well as that for oxygen transport.

Comparison of levulose with dextrose as to ability to inhibit the lactic acid response in these children showed little difference in the effect of these two sugars. The only children in whom any response could be considered significant were the asthenic ones, as the effect of training dominated all other possible responses in the normal child.

Lactose and sucrose had no inhibiting effect on the rise in the level for fixed acid during exercise in the subjects studied. In the case of sucrose the amount of fixed acid entering the blood was definitely in excess of the fasting value at the fifteen minute period.

In all subjects studied exercise produced a depression in the curve for sugar as determined with the same amount of sugar without exercise. Usually the effects of exercise could be observed after fifteen minutes.

CONCLUSIONS

Exercise in the fasting condition elicits a uniform response, in that there is an increase in the content of fixed acid in the blood in both the normal and the asthenic child. In a few isolated cases this rise in the level of fixed acid seemed to be more marked and its return to the original level seemed more gradual in the asthenic child than in the normal child. Examples of this tendency are shown in the accompanying

charts. Averages of the entire series did not show this to be the case, but the subjects showing spectacular rises in the level of fixed acid were definitely asthenic.

There was no marked uniformity of response to the ingestion of sugar on the inhibition of the entrance of fixed acid into the blood after exercise as compared with that in the fasting condition. That is, the majority of subjects showed a lowering of the level of fixed acid after the ingestion of sugar, but the response of the asthenic children was not uniformly characteristic of that group.

An improvement in the child's ability to exercise for a longer time and to do more work with less production of lactic acid was dependent on training to a greater extent than to the effect of the ingestion of sugar, although the latter undoubtedly decreased the amount of fixed acid in more than half the subjects studied. The influence of training was so marked in all subjects studied that its effects overshadowed the inhibiting effects of sugar.

Dextrose seemed to be the most efficient of the sugars studied for the alleviation of the accumulation of lactic acid due to exercise. Levulose gave similar results in a number of cases but not the uniform response given by dextrose in subjects to whom both sugars were given.

Lactose and sucrose had no inhibiting effect on the rise in the level of exercise-fixed acid in the subjects studied.

SUSCEPTIBILITY OF THE NEW-BORN TO ACUTE BACILLARY DYSENTERY

SEROLOGIC DATA ON THE PLACENTAL TRANSMISSION OF ANTIBODIES TO BACILLUS DYSENTERIAE

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AND
A. G. OSOFSKY, M.A.
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The increasing incidence of bacillary dysentery and its appearance in new and atypical forms have been referred to in previous papers.[1] Epidemic and sporadic outbreaks have been encountered, many of them occurring in hospitals and institutions. Clinical evidence indicates marked susceptibility in new-born infants and young children to the acute forms of the disease. In the epidemic in Jersey City (Flexner type), as previously reported,[1a] 85 per cent of the hospitalized patients were infants and children. In an outbreak of the Sonne-Duval type of dysentery [1b] all the patients in the primarily affected group were infants and children. The literature is replete with similar instances.[2] The present study, of one hundred mothers and their new-born infants, was undertaken in an attempt to determine the reason for the susceptibility of the latter to acute bacillary dysentery. The practical application of our findings in clinical and preventive medicine will be indicated.

From the Department of Laboratories and Research, the Bronx Hospital, New York.

1. (*a*) Felsen, J.; Rundlett, E. V.; Sullivan, J., and Gorenberg, H.: Atypical Flexner Dysentery: A Preliminary Report of the Jersey City Epidemic, J. A. M. A. **103**:1055 (Oct. 6) 1934. (*b*) Felsen, J., and Osofsky, A. G.: Sonne (Duval) Dysentery, ibid. **103**:966 (Sept. 29) 1934. (*c*) Felsen, J.: Clinical Notes Concerning Distal Ileitis as a Manifestation of Bacillary Dysentery, Am. J. Digest. Dis. & Nutrition **1**:782, 1935; (*d*) Appendicular Form of Bacillary Dysentery, Am. J. Dis. Child. **50**:661 (Sept.) 1935; (*e*) Bacillary Dysentery: Acute Fulminating Type with Marked Toxic Neutropenia, New York State J. Med. **35**:1037 (Oct. 15) 1935.

2. A few representative references are as follows: Duval, C. W., and Shorrer, E. H.: Report on Studies of Diarrheal Diseases of Infancy, Studies from the Rockefeller Institute of Medical Research, 1904, vol. 2, p. 42. Johnston, M. M., and Brown, A.: Cases of Intestinal Intoxication in Children Attributed to B. Dysenteriae Sonne, Canad. M. A. J. **24**:364 (March) 1931. Nelson, R. L.: Sonne Dysentery: A Report of Thirty Cases of Dysentery in Children Caused by B. Dysenteriae Sonne, Am. J. Dis. Child. **41**:15 (Jan.) 1931. Richards, R.: Bacillary Dysentery in Aberdeen, Brit. J. Child. Dis. **24**:31 (Jan.-March) 1927.

Although the transmission of maternal antibodies through the placenta is a commonly accepted phenomenon, a study of the available material indicates that unanimity of opinion on this subject has not been established. There seems to be little question but that in diphtheria a fairly complete transfer of circulating antibodies from mother to child takes place. Ruh and McClelland [3] demonstrated in a series of 95 cases that mothers and infants have similar reactions to the Schick test, with few exceptions. Toomey and August [4] were able to demonstrate the ability of placental serum to blanch the scarlatinal rash. Further support to the theory of the placental transmission of protective antibodies has been given in observations on a number of other infectious diseases. Aycock and Kramer [5] demonstrated the complete correspondence of the neutralizing poliomyelitis antibodies of mothers and infants. The transmission of tetanus antitoxin by the placental route was reported by Ten Broeck and Bauer.[6] In a study on the permeability of the human placenta, Bourquin [7] reported that agglutinins and hemolysins have essentially the same concentration in maternal and in fetal blood. Guyer and Smith [8] studied the production of typhoid agglutinins in successive generations of rabbits. They found that rabbits in the fourth generation of a series which had undergone immunization to Bacillus typhosus vaccine yielded a higher antibody titer than animals without this heredity. After immunizing pregnant females and testing the fetal blood they concluded that typhoid agglutinins do pass through the placenta.

On the other hand, evidence has been accumulated by other investigators which tends to minimize the rôle of the placenta in the passage of normal antibodies. Reymann [9] conducted a study of this question with the goat. Goats were immunized to Bacillus coli and B. typhosus and to the red blood cells of the horse and the rabbit. After immunization the serums of all the mothers contained agglutinins for the specific antigens. Of the fourteen new-born kids, however, only one showed

3. Ruh, H. O., and McClelland, J. E.: Comparison of Diphtheria Immunity in Mother and New-Born, Am. J. Dis. Child. **25**:59 (Jan.) 1923.

4. Toomey, J. A., and August, M. H.: Studies in Scarlet Fever: VII. Blanching with Placental Serum, Am. J. Dis. Child. **38**:453 (Sept.) 1929.

5. Aycock, W. L., and Kramer, S. D.: Immunity to Poliomyelitis in Mothers and the Newborn as Shown by the Neutralization Test, J. Exper. Med. **52**:457, 1930.

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the presence of agglutinins. With the ingestion of colostrum and breast feeding, agglutinins appeared, demonstrating that the antibodies were not transmitted through the placenta. Nattan-Larrier and Lepine [10] tested the trypanocidal action of maternal serums and cord drippings for Trypanosoma Brucei. Although lytic antibodies were present in the serum of eleven of twelve mothers, the serum of only three of the twelve fetuses showed similar lytic power. In a recent study, Toomey [11] tested the agglutinins of mothers' blood, babies' blood, mothers' milk and placental blood for multiple strains of B. coli. He reported that positive agglutination to a titer of 1:40 was obtained with the mothers' blood in twenty-six cases of a series of twenty-eight, with the mothers' milk in twenty-six and with the placental blood in only nine. With a dilution of 1:80 the numbers of serums agglutinating the antigen were, respectively, twenty-one, seven and one. This seems to indicate that only small amounts of agglutinins passed through the placenta. When the same babies were tested ten days after birth, however, there was a marked increase in the presence of agglutinins. At this time twenty of twenty-eight babies showed a titer of 1:40, thirteen a titer of 1:80 and none a titer of 1:160. These observations concerning the importance of colostrum to the new-born corroborate the earlier studies of Kuttner and Ratner [12] on this question in reference to diphtheria.

SEROLOGIC STUDIES

In our study the serums of one hundred mothers and babies was subjected to agglutination tests with six strains of Bacillus dysenteriae. All except B. dysenteriae Shiga are frequently encountered in the New York area. It was felt that the results obtained might aid in determining the reasons for the susceptibility of new-born infants to bacillary dysentery.

Materials.—

1. Serums:
   (*a*) Mothers: Blood was obtained from the median basilic vein at the time of delivery.
   (*b*) Infants: Five cubic centimeters of blood was obtained by allowing blood from the umbilical vessels to drip into a sterile tube prior to tying off the umbilicus.

By obtaining the specimens in this manner it was possible to exclude any external factors, such as breast feeding, which might alter the agglutination titer of the infant's blood.

2. Diluent: An 0.85 per cent sterile saline solution was used as a diluent in all the agglutination tests.

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10. Nattan-Larrier, L., and Lepine, P.: Compt. rend. Soc. de biol. **97**:1470, 1927.

11. Toomey, J. A.: Agglutinins in Mother's Blood, Baby's Blood, Mother's Milk and Placental Blood, Am. J. Dis. Child. **47**:521 (March) 1934.

12. Kuttner, A., and Ratner, B.: The Importance of Colostrum to the New-Born Infant, Am. J. Dis. Child. **25**:413 (June) 1923.

3. Organisms: Eighteen hour broth cultures (p_H 7) of the following strains of B. dysenteriae were used in testing the agglutinating powers of the mothers' and infants' serums: Flexner Y, Flexner (Jersey City), Mount Desert, Sonne-Duval, Park-Hiss and Shiga.

It may be noted that the three major groups of micro-organisms involved in bacillary dysentery are represented in these strains. The purity of the strains was repeatedly verified morphologically, serologically and physiologically to insure the uniformity of the antigen used in the agglutination tests. In regard to colonial structure, the organisms were all of the S type.

Technic.—In the agglutination tests the serum of the mother was tested at the same time as that of the infant. It was found preferable to test a series of mother and baby serums in one set-up, so that greater uniformity in the reading of the results could be obtained.

TABLE 1.—*Agglutination Titers of One Hundred Mothers and Babies Against Six Strains of B. Dysenteriae* *

Organism	Serum Dilution	Mother	Baby
B. dysenteriae Flexner Y	Negative	67	98
	1:40	16	2
	1:80	11	0
	1:160	6	0
B. dysenteriae Flexner (Jersey City)	Negative	59	100
	1:40	20	0
	1:80	17	0
	1:160	4	0
B. dysenteriae Mount Desert	Negative	56	93
	1:40	16	6
	1:80	17	1
	1:160	11	0
B. dysenteriae Shiga	Negative	81	97
	1:40	14	3
	1:80	4	0
	1:160	1	0
B. dysenteriae Sonne-Duval	Negative	90	98
	1:40	8	2
	1:80	2	0
	1:160	0	0
B. dysenteriae Park-Hiss	Negative	32	92
	1:40	19	5
	1:80	33	3
	1:160	16	0

* Total percentage of diagnostic titers in babies, 0; total percentage of diagnostic titers in mothers, 21.

The tests were performed as follows:

To three specimens of 0.5 cc. of the serum, diluted 1:20, 1:40 and 1:80, respectively, was added 0.5 cc. of an eighteen hour broth culture of the organism. The resulting dilutions of the serum were thus 1:40, 1:80 and 1:160. To preclude the possibility of error due to spontaneous agglutination, a saline control solution was used throughout the experiment. On the other hand, the agglutinability of the strains of B. dysenteriae used in the tests was checked with homologous immune serum.

After the addition of the cultures, the tubes were incubated in a water bath at 55 C. for four hours and in the refrigerator overnight. Readings were taken the following morning. Positive agglutination was recorded only when a reading of 2+ was obtained.

Results.—In table 1 are listed the agglutination titers of one hundred mothers and babies. For the series of mothers' serums the titers

varied somewhat according to the strain of B. dysenteriae, but in general the results conform with the figures obtained by the authors in a previous study of the serum of three hundred normal persons.[13] The highest percentages of agglutination were obtained with B. dysenteriae Mount Desert and with B. dysenteriae Park-Hiss, which is not surprising in view of the greater incidence of bacillary dysentery due to these organisms.

The results differ, however, for the series of infants' serums. Here the great majority of specimens contained no agglutinins for the dysen-

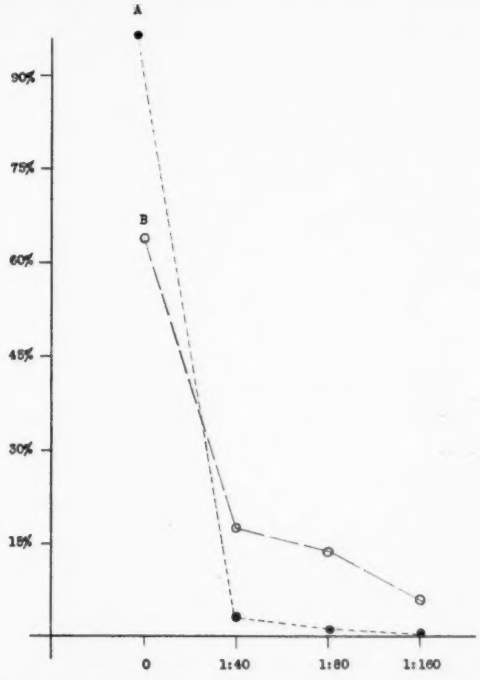

Chart showing a comparison of babies' and mothers' titers against B. dysenteriae. *A* indicates the distribution of agglutination titers for one hundred babies and *B*, the distribution for one hundred mothers.

teric group of micro-organisms. The percentage of negative results varied from 92 per cent with B. dysenteriae Park-Hiss to 100 per cent with B. dysenteriae Flexner (Jersey City). In not a single case was a titer of 1 : 160 obtained with an infant's serum.

A graphic comparison is drawn in the chart between the average titer obtained with the mothers' and that obtained with the infants'

13. Felsen, J., and Osofsky, A. G.: Control Agglutination Studies Against B. Dysenteriae on the Serums of Three Hundred Individuals in the New York City Area, Am. J. Pub. Health **25**:1027 (Sept.) 1935.

serums. One may see that in terms of the entire series the antibodies to the dysentery group were far less numerous in the babies than in the mothers. A more detailed comparison of the two series is contained in table 2, in which the actual titers of both the mothers and the babies

TABLE 2.—*Comparative Study of Agglutination Titers Against B. Dysenteriae in Mothers and Infants*

Number	Patient	B. Dysenteriae Flexner Y	B. Dysenteriae Flexner (Jersey City)	B. Dysenteriae Mount Desert	B. Dysenteriae Shiga	B. Dysenteriae Sonne-Duval	B. Dysenteriae Park-Hiss
1	Baby	0	0	0	1:40	0	0
	Mother	0	0	1:40	1:80	0	1:160
10	Baby	0	0	1:80	0	0	0
	Mother	1:40	1:40	1:160	0	0	1:160
18	Baby	1:40	0	0	0	0	0
	Mother	0	0	1:160	0	0	1:40
23	Baby	0	0	0	1:40	1:40	0
	Mother	0	0	0	0	0	1:40
24	Baby	0	0	1:40	0	0	0
	Mother	1:40	1:40	1:80	0	0	1:160
33	Baby	0	0	0	0	0	1:40
	Mother	1:40	1:80	1:160	1:40	1:40	1:160
40	Baby	0	0	1:40	0	0	0
	Mother	1:80	1:80	1:40	0	0	0
61	Baby	0	0	1:40	0	0	0
	Mother	0	0	1:80	0	0	0
63	Baby	0	0	0	0	0	1:40
	Mother	1:160	1:80	1:160	1:40	0	1:160
66	Baby	0	0	1:40	1:40	0	0
	Mother	0	0	1:80	1:40	0	0
68	Baby	0	0	0	0	0	1:40
	Mother	1:160	1:80	1:40	0	0	1:160
71	Baby	0	0	0	0	0	1:40
	Mother	0	1:40	0	1:40	0	1:80
76	Baby	0	0	0	0	0	1:40
	Mother	0	0	0	0	0	0
77	Baby	0	0	0	0	0	1:80
	Mother	0	0	1:40	0	0	1:80
85	Baby	1:40	0	0	0	0	1:80
	Mother	1:160	1:160	1:80	0	0	1:160
91	Baby	0	0	1:40	0	0	1:80
	Mother	0	0	1:40	0	0	1:80
93	Baby	0	0	0	0	1:40	0
	Mother	0	0	0	0	1:80	0
95	Baby	0	0	1:40	0	0	0
	Mother	1:40	0	1:40	1:40	0	1:80

are listed. In this table data are included only for the cases in which positive agglutination was obtained with the baby's serum.

Generally speaking, the dysentery antibodies contained in the infants' serums are a reflection to a lesser degree of the agglutinins present in the serums of the mothers. In only two cases, 23 and 76, does there seem to have been a complete lack of correspondence between the parent and the offspring. In the remaining cases the correspondence was not limited to the particular strain of B. dysen-

teriae but applied also to the representatives of the mannitol-fermenting group of dysentery organisms, typified by B. dysenteriae Flexner Y.

Table 3 gives the data obtained in follow-up agglutination studies of ten breast-fed babies whose mothers showed a titer of diagnostic significance. This is an independent series of cases. In two cases the interval before the second study was long. In one of these (case 1) there was no increase in the baby's titer, and in the other (case 2) there was a definite increase, to 1 : 80, although the titer did not become as high as that of the mother at the time of delivery. In eight cases the interval between birth and the second study was from seven to ten days. In two of these (cases 9 and 10) no agglutinins were observed at either test. In four (cases 5, 6, 7 and 8) whatever agglutinins had

TABLE 3.—*Data Obtained in Follow-Up Agglutination Studies of Ten Breast-Fed Babies Whose Mothers Showed Titers of Diagnostic Significance*

	Mother's Titer*	Baby's Titer at Birth*	Days After Birth	Baby's Titer	Result
1	F, MD, PH 160	PH 40	58	PH 40	No increase
2	MD, PH 160	Negative	64	MD PH 80	Increase
3	MD 160	MD 80	7	MD 160	Increase
4	MD 160, PH 80	Negative	8	PH 40	Increase
5	F, JC, MD, PH 160	MD 80	10	Negative	Decrease
6	MD, PH 160	MD 160	9	Negative	Decrease
7	MD, PH 160	MD 160	8	Negative	Decrease
8	PH 160	MD 40	8	Negative	Decrease
9	MD, PH 160	Negative	8	Negative	Negative
10	JC, MD, PH 160	Negative	8	Negative	Negative

* Strains of B. dysenteriae are indicated as follows: F, Flexner Y; JC, Flexner (Jersey City); MD, Mount Desert, and PH, Park-Hiss.

been present at birth had disappeared. In two (cases 3 and 4) there was a definite increase in agglutinins.

Interpretation.—From the results recorded in the determination of dysentery agglutinins for one hundred babies and mothers it may be inferred that the passage of antibodies to B. dysenteriae through the human placenta is not the prime factor in the development of immunity in the new-born. In our study the question of the origination of antibodies through the ingestion of colostrum was not considered, but its importance should be kept in mind. At present an investigation is being undertaken to determine whether the antibody titer for B. dysenteriae increases after breast feeding and how soon after birth a significant rise in the titer does take place.

In the light of present knowledge, however, it may not be too much to presume a relationship between the general lack in infants of humoral antibodies to micro-organisms of the dysentery group and the incidence

of bacillary dysentery in the new-born. The higher mortality rate for bacillary dysentery in infants is another factor which might be considered in relation to the results obtained from this study.

CLINICAL CONSIDERATIONS

Clinical experience during the past few years points to certain controllable factors which account for outbreaks of bacillary dysentery in hospitals and institutions:

1. Failure to recognize the atypical forms of the disease.
2. Incomplete laboratory studies.
3. The tendency to conceal known or suspected cases because of possible legal complications, until the spread of the disease or the attendant mortality makes disclosure imperative.
4. Haphazard measures of sanitation and isolation.
5. Failure to examine periodically all food handlers and all nursing personnel in obstetric and pediatric services.
6. Lack of centralized epidemiological control.
7. Deductions from the pay of employees during illness.

These factors will be taken up briefly in turn.

Atypical Forms of the Disease.—Attention has been called to the mild Sonne-Duval, appendicular and meningitic forms encountered in the lower age groups.[1] The asymptomatic and afebrile types and the forms that are characterized by constipation are almost impossible to diagnose in infants and children except during epidemics. The agranulocytoid form has thus far been seen only in adults. An outstanding example of the undiagnosed appendicular form of bacillary dysentery occurred during an outbreak[1b] of the type Sonne-Duval in which the disease was finally traced to a child who had been operated on eight weeks previously for what had appeared to be appendicitis. Cramps and diarrhea on the day of admission were presumably associated with the appendicitis, but bloody diarrhea persisted for eight days. A fecal culture was still positive during the tenth week. The incubation period of acute bacillary dysentery was definitely proved to be not more than twelve hours in one case recently encountered. Symptoms in the upper respiratory tract associated with mesenteric lymphadenitis and a temperature as high as 105 F. may usher in the disease. Leukopenia is frequently encountered in acute bacillary dysentery. Acute distal ileitis is merely one manifestation of the disease, which may attack any part of the small or the large bowel. The most frequent cause of bloody diarrhea in infants is bacillary dysentery. The diagnosis should not be discarded until at least six fecal cultures

on successive days as well as examinations for bacteriophage and agglutination titer have been made. A negative report for B. dysenteriae is, like a negative Wassermann test, inconclusive.

Laboratory Studies.—Positive fecal cultures are most frequently obtained during the first week, after which a rising agglutination titer and diagnostic bacteriophage are observed. In the Sonne-Duval type of dysentery the titer may not rise above 1 : 50, but in all other forms it is at least 1 : 100.

Concealed Information.—There is an ever present tendency on the part of institutions to avoid publicity during outbreaks of dysentery, usually because of legal complications. Sometimes the purpose is merely to avoid unwarranted reflection on the institution as a whole. Financial or political considerations play a rôle in our cities and towns. This policy merely perpetuates the very conditions necessary for proper control.

Improper Measures of Sanitation and Isolation.—Procrastination or compromise in the treatment of bacillary dysentery is as harmful as it is in the treatment of typhoid. "Typhoid-dysentery precautions" should be substituted for "typhoid precautions." Any instance of diarrhea, regardless of its cause, should be noted in the admitting room, and the patient should be isolated until typhoid or dysentery has been ruled out.[14] Standing orders should be issued to the nursing staff that if diarrhea occurs after hospitalization similar measures are to be adopted at once and are to be continued until the patient is released by the attending physician.

Periodic Surveys.—Monthly fecal cultures should be made for all food handlers, for all personnel of the obstetric and pediatric services and for persons before they are engaged as employees in those departments.

Centralized Epidemiological Control.—All cases of diarrhea should be reported at once to a single physician (or substitute) who has been made responsible for proper diagnosis and release from isolation. In some localities this physician can be the district health officer. All cases in which the diagnosis is presumptive or proved should be reported to the department of health.

Deductions from Pay During Illness.—It was found in many instances that lay employees and nurses failed to absent themselves from duty although they were suffering from mild dysentery because they feared deductions from their pay. Persons with diarrhea should be paid to stay off duty until released by the physician responsible because,

14. The measures advocated in this study have been used at the Bronx Hospital for the past two years and have proved efficacious.

aside from the moral implications, the possible benefits accruing to the hospital far outweigh the immediate monetary loss.

The major damage by the toxin of B. dysenteriae is effected within the first twenty-four or forty-eight hours, and therapeutic serum to be most effective must be used within this period. Besides general supportive treatment, intravenous injection of a physiologic solution of sodium chloride or of 5 per cent dextrose in a saline solution is advisable for all dehydrated patients. Castor oil should be used early in the disease to help the elimination of dysentery toxin. Transfusion is helpful when the condition is toxic, particularly if patients who have recovered from dysentery are used as donors. The use of prophylactic doses of antidysentery serum is suggested for exposed persons. All patients with acute bacillary dysentery should be observed for one year as a possible safeguard against the development of chronic lesions (chronic distal ileitis, chronic ulcerative colitis). Follow-up studies after the Jersey City epidemic revealed an incidence of chronic lesions of 10.7 per cent by the end of one year.[15]

SUMMARY

For a series of one hundred mothers and infants a marked diminution in the agglutinin content in the infants' blood as compared with that in the mothers' blood was found.

Although a slight placental transfer of agglutinins does take place, the placenta does not appear to be the general route for the transfer of antibodies from mother to infant.

A possible relationship between this finding and the general susceptibility of the new-born to bacillary dysentery is suggested.

Unorthodox clinical types of bacillary dysentery are described; they are responsible for many cases in which the condition is undiagnosed.

Prophylactic and therapeutic measures against the disease are outlined.

Dr. M. Rosensohn and Dr. H. Aranow, attending obstetricians, cooperated in this study.

15. Felsen, J., and Gorenberg, H.: Chronic Dysentery, Distal Ileitis and Ulcerative Colitis: A Follow-Up of the Jersey City Epidemic of Bacillary Dysentery, Am. J. M. Sc. **192**:553, 1936. Felsen, J.: Acute and Chronic Bacillary Dysentery, Am. J. Path. **12**:395, 1936.

GROWTH AND BASAL METABOLISM

V. BASAL METABOLISM OF HIGH SCHOOL CHILDREN

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It is at present an interesting and at the same time a difficult problem to establish normal standards of basal metabolism for children at puberty. Since the report made on the basal metabolism of preschool and elementary school children in previous papers,[1] I have attempted to make a general survey on the metabolism of children of high school grade—the most difficult problem of today in connection with basal metabolism. In this report I present an approximate value for the metabolism of these children. The next paper in the series [2] treats of the effect of puberty on the metabolism of children; in other words, it gives the results of individual observations on the metabolic change throughout pubescence. Thus comparison has been made with the results of other investigators.

EXPERIMENTAL METHOD

Twenty-three high school children, ten boys and thirteen girls, between the ages of 12 years and 1 month and 15 years and 3 months served as subjects. All of them were healthy (table 1).

All the tests were conducted in the spring, with a view to excluding a seasonal influence. The description of the experimental method is omitted here as it has been given in the previous paper.[3] The results obtained are expressed, as in the previous studies, in terms of calories per square meter of body surface per hour, calories per kilogram of body weight per twenty-four hours and total calories per day (table 2).

RESULTS

In the literature with reference to the basal metabolism of children there are the reports of Du Bois,[4] Bailey, Molitch and Cousins,[5] Blunt

1. Nakagawa, I.: Growth and Basal Metabolism: I. Basal Metabolism of Preschool Children, Am. J. Dis. Child. **47**:963 (May) 1934; Growth and Basal Metabolism: II. Basal Metabolism of Elementary School Children, ibid. **48**:35 (July) 1934.

2. Nakagawa, I.: Growth and Basal Metabolism: VI. Changes in the Basal Metabolism of Children During Puberty, Am. J. Dis. Child., this issue, p. 991.

3. Nakagawa, I.: Growth and Basal Metabolism: IV. Changes in the Basal Metabolism of Children During a Year, Am. J. Dis. Child **49**:1232 (May) 1935.

4. Du Bois, E. F.: Basal Metabolism in Health and Disease, Philadelphia, Lea & Febiger, 1927.

5. Molitch, M., and Cousins, R. F.: Variation of Basal Metabolism Rate per Unit Surface Area with Age, J. Nutrition **8**:247, 1934.

TABLE 1.—*Physical Characteristics of the Children Tested*

No.	Name	Age Yr.	Age Mo.	Weight, Kg.	Height, Cm.	Chest Girth, Cm.	Sitting Height, Cm.	Body Surface, Sq. M.	Pulse Rate	Respiratory Rate	Temperature C.	Temperature F.
Boys												
1	To. S.	12	2	31.15	141.3	63.6	77.0	1.12	73	18	36.2	97.16
2	I. S.	13	9	43.20	161.2	75.4	84.8	1.42	69	16	35.9	96.62
3	K. S.	14	3	33.10	140.9	69.7	75.0	1.15	52	16	36.2	97.16
4	K. K.	14	3	47.80	161.0	82.5	88.8	1.48	75	16	36.3	97.34
5	T. N.	14	3	42.35	162.7	71.1	86.4	1.42	87	17	36.8	98.24
6	M. G.	14	4	42.00	159.6	75.1	86.9	1.39	72	16	36.6	97.88
7	K. H.	14	5	32.30	144.7	69.2	78.0	1.16	72	20	36.2	97.16
8	T. I.	14	5	48.50	169.4	75.4	89.7	1.54	67	17	36.0	96.80
9	T. K.	14	11	42.15	157.9	74.8	87.2	1.38	70	18	36.0	96.80
10	M. Y.	15	3	46.35	159.7	74.9	85.7	1.45	54	18	36.1	96.98
Girls												
11	S. S.	12	1	34.35	142.8	69.5	78.2	1.18	104	19	37.2	98.96
12	S. O.	12	2	30.45	137.5	63.1	75.0	1.09	78	15	36.2	97.16
13	H. H.	12	3	35.40	146.5	66.3	81.1	1.22	80	16	36.4	97.52
14	M. S.	12	9	45.10	156.6	76.2	82.5	1.42	58	16	35.9	96.62
15	K. T.	13	3	33.75	143.6	69.8	79.9	1.17	82	18	35.9*	96.62
16	Ma. S.	13	4	32.80	137.0	67.2	74.3	1.12	88	14	36.3	97.34
17	K. N.	13	6	39.10	156.4	68.1	83.5	1.33	75	16	36.2	97.16
18	K. S.	13	11	35.75	141.8	70.2	77.8	1.19	77	14	35.7	96.26
19	K. U.	14	1	33.50	143.2	69.6	80.3	1.17	81	18	36.5	97.70
20	Y. Y.	14	1	40.00	146.6	73.7	80.4	1.28	86	17	36.4	97.52
21	I. O.	14	2	34.00	145.0	70.0	78.2	1.19	96	15	....	.....
22	T. K.	14	3	42.20	147.7	73.3	81.8	1.32	68	17	36.3†	97.34
23	A. S.	14	8	36.70	142.5	72.4	79.3	1.21	70	18	36.3	97.34

* Menstruation began at the age of 13 years and 2 months.
† Menstruation began at the age of 13 years and 4 months.

TABLE 2.—*Results of Tests*

No.	Name	Oxygen Consumed, Liters	Carbon Dioxide Produced, Liters	Respiratory Quotient	Nitrogen Excreted in Urine, Gm.	Basal Heat Production: Calories per Hour: Total	Basal Heat Production: Calories per Hour: Per Sq. M.	Basal Heat Production: Calories per Day: Per Kg.	Basal Heat Production: Calories per Day: Total	Burned Material: Protein, %	Burned Material: Carbohydrate, %	Burned Material: Fat, %
Boys												
1	To. S.	11.410	9.985	0.88	0.5301	54.30	48.48	41.84	1,303	25	50	25
2	I. S.	13.111	11.486	0.88	0.4003	63.01	44.37	35.01	1.512	16	53	31
3	K. S.	10.260	9.802	0.96	0.5066	49.73	43.24	36.06	1,194	26	74	0
4	K. K.	12.613	11.542	0.92	0.5563	60.71	41.02	30.48	1,457	24	63	13
5	T. N.	13.614	11.679	0.86	0.5809	64.74	45.59	36.69	1,554	23	46	31
6	M. G.	12.155	11.450	0.94	0.5065	59.07	42.50	33.75	1,418	22	75	3
7	K. H.	10.366	8.921	0.86	0.4046	49.42	42.60	36.72	1,186	21	47	32
8	T. I.	13.144	11.954	0.91	0.4362	63.69	41.36	31.52	1,529	17	65	17
9	T. K.	11.301	9.883	0.87	0.3820	54.18	39.26	30.85	1,300	18	51	31
10	M. Y.	12.210	10.550	0.86	0.4651	58.25	40.17	30.16	1,398	21	47	32
Girls												
11	S. S.	10.413	8.788	0.84	0.3246	49.61	42.04	34.66	1,191	17	41	42
12	S. O.	9.200	9.068	0.99	0.1444	45.85	42.06	36.14	1,100	8	92	0
13	H. H.	11.008	10.056	0.91	0.4029	53.20	43.61	36.07	1,277	20	64	16
14	M. S.	11.098	9.934	0.90	0.4551	53.23	37.49	28.33	1,278	22	56	21
15	K. T.	9.942	9.069	0.91	0.3729	48.02	41.04	34.15	1,152	20	63	17
16	Ma. S.	9.820	8.417	0.86	0.4132	46.72	41.71	34.19	1,121	23	46	31
17	K. N.	9.958	8.606	0.86	0.3679	47.55	35.75	29.19	1,141	20	47	33
18	K. S.	8.205	6.967	0.85	0.3612	38.90	32.69	26.11	934	24	42	34
19	K. U.	9.549	8.707	0.91	0.4209	45.96	39.28	32.93	1,103	24	63	13
20	Y. Y.	11.023	9.746	0.88	0.4172	52.90	41.33	31.74	1,270	20	56	24
21	I. O.	10.435	9.196	0.88	0.3165	50.26	42.24	35.48	1,206	16	55	29
22	T. K.	9.142	8.158	0.89	0.4607	43.62	33.05	24.81	1,047	27	56	17
23	A. S.	9.691	8.962	0.92	0.3210	47.06	38.89	30.77	1,129	18	68	14

and his co-workers,[6] Bedale [7] and MacLeod.[8] In Japan there are only two reports, those of Imamura [9] and Takahira and his associates.[10] A summary of the data of some of these authors concerning the average number of calories per square meter per hour for the different ages is given in table 3.

Though a general idea of the basal metabolism for the different ages can be had from the table, considerable discrepancy is noticeable between the data of any two authors. This discrepancy—seen even in the data of Imamura and Takahira and my own for Japanese children of the same age—may be due partly to the difference in the race, the experimental method and the apparatus but is mainly accounted for by the small number of cases. There are extremely wide variations in the basal metabolism of normal children at puberty, just as there are in

TABLE 3.—*Comparison of the Basal Heat Production Recorded by Different Investigators (Calories per Square Meter of Body Surface)*

Boys, Age	Nakagawa	Takahira and Others	Imamura	Du Bois	Bailey	Molitch and Others	Bedale
12	48.48	47.71	51.29	47.8	48.0	41.9	34.93
13	.....	43.80	47.92	47.1	47.0	39.7	43.18
14	42.95	44.97	50.04	46.2	46.0	36.2	35.16
15	39.72	40.88	52.88	45.3	45.0	41.1	40.13
Girls, Age	**Nakagawa**	**Takahira and Others**	**MacLeod**	**Du Bois**	**Bailey**	**Blunt and Others**	**Bedale**
12	42.57	.....	41.3	43.4	45.0	42.3	43.89
13	39.00	41.41	41.0	42.0	44.0	41.0	43.08
14	37.72	42.33	36.6	41.0	43.0	40.7	34.18
15	38.89	.....	....	39.6	42.0	35.3	38.34

the rate of growth and the sexual development.[11] This makes it difficult to establish normal standards of basal metabolism for children at puberty unless a larger number of children can be studied than have been studied at the other ages. Anything worth while which is deduced from such a small number of cases has to do with the effect of puberty on the basal metabolism, as was noticed by Du Bois.

6. Blunt, K.; Tilt, J.; McLaughlin, L., and Gunn, K. B.: The Basal Metabolism of Girls, J. Biol. Chem. **67**:491, 1926.

7. Bedale, E. M.: Proc. Roy. Soc., London, s.B **94**:368, 1923.

8. MacLeod, G.: Studies of the Normal Basal Energy Requirement, Inaug. Dissert., New York, Columbia University Press, 1924.

9. Imamura, K.: Studies on the Respiratory Metabolism of Elementary School Boys, Jika-Zassi, no. 363, p. 1.

10. Takahira, H.; Kitagawa, T.; Isibasi, E., and Kayano, S.: On Basal Metabolism in the Period of Growth, Rep. Imp. Gov. Inst. Nutrition **6**:37 (March) 1934.

11. Topper, A., and Mulier, H.: Basal Metabolism of Normal Children: The Puberty Reaction, Am. J. Dis. Child. **43**:327 (Feb.) 1932.

The basal metabolic rate was higher for boys than for girls, and no period was observed at which the metabolic rate of girls was higher than that of boys, as Topper and Mulier [11] reported.

In a previous paper [12] I reported that the surface area was of less value for children and that the weight should be taken as most nearly expressing their basal heat production until a better unit is devised. I determined the correlation between the total amount of heat produced and the physical factors (weight, height and surface area) from the data of various authors for children at puberty (table 4).

TABLE 4.—*Correlation Coefficients Between Total Heat Production and Physical Factors*

Authors	Cases of Experiments	Average Age	Correlation Coefficient	
Boys				
Topper and Mulier	28	11-16	Weight	0.9009 ± 0.0240
			Height	0.8129 ± 0.0432
			Body surface	0.9263 ± 0.0181
Takahira, Kitagawa and others	37	11-19	Weight	0.6695 ± 0.0612
			Height	0.7002 ± 0.0565
			Body surface	0.6819 ± 0.0593
Nakagawa	10	12-15	Weight	0.7868 ± 0.0812
			Height	0.8744 ± 0.0502
			Body surface	0.8379 ± 0.0635
Girls				
Topper and Mulier	68	10-16	Weight	0.7598 ± 0.0346
			Height	0.7758 ± 0.0326
			Body surface	0.8404 ± 0.0240
Katharine Blunt and others	47	12-18	Weight	0.6694 ± 0.0543
			Height	0.5724 ± 0.0661
			Body surface	0.6690 ± 0.0543
Takahira, Kitagawa and others	10	13-14	Weight	0.6905 ± 0.1116
			Height	0.8382 ± 0.0634
			Body surface	0.7622 ± 0.0894
Nakagawa	13	12-15	Weight	0.2547 ± 0.1749
			Height	0.4055 ± 0.1563
			Body surface	0.3570 ± 0.1632

For boys, height has the closest relation to the total heat production both in Takahira's and in my data and surface area in Topper's. For girls, height has the closest relation to the total heat production in Takahira's data, surface area in Topper's and body weight in Blunt's (this measurement was omitted from my data because the values were under one third of their probable errors).

In any case, for the unit to express the amount of heat produced, the surface area is not so conclusive at puberty as at maturity. Nor can I demonstrate that the weight is the most reasonable and practical

12. Nakagawa, I.: Growth and Basal Metabolism: III. Biometric Study of Basal Metabolism of Preschool and Elementary School Children, Am. J. Dis. Child. **48**:39 (July) 1934.

factor for expressing the basal heat production of high school children. Therefore, I cannot draw a definite conclusion as to which of these physical factors is the best for expressing the basal heat production of children at puberty.

In my previous paper [2] I compared the results obtained in my tests for preschool and elementary school children with the Benedict and Talbot standards and reported that Japanese children had a higher metabolic rate but that the percentage of deviation from the standards

TABLE 5.—*Basal Heat Production per Day and Percentage of Deviation from the Talbot Standards (New Data)*

Name	Age Yr.	Age Mo.	Weight, Kg.	Height, Gm.	Percentage of Deviation from Baldwin-Wood Standards: Weight Referred to Height and Age	Percentage of Deviation from Baldwin-Wood Standards: Height Referred to Weight and Age	Observed Values, Calories	Percentage of Deviation from Standards: Referred to Weight	Percentage of Deviation from Standards: Referred to Height
S. S.	12	1	34.35	142.8	— 4	+2	1,191	+ 9.9	+ 3.5
S. O.	12	2	30.45	137.5	— 6	+4	1,100	+ 4.1	+ 1.4
H. H.	12	3	35.40	146.5	— 9	+3	1,277	— 2.7	— 9.7
M. S.	12	9	45.10	156.6	— 7	+2	1,278	+ 1.7	— 2.9
K. T.	13	3	33.75	143.6	—11	+3	1,152	+ 2.5	+ 0.5
Ma. S.	13	4	32.80	137.0	— 1	0	1,121	—20.1	—19.3
K. N.	13	6	39.10	156.4	—19	+6	1,141	— 7.5	—19.2
K. S.	13	11	35.75	141.8	— 5	+2	934	+ 0.4	+ 3.2
K. U.	14	1	33.50	143.2	—11	+4	1,103	+ 2.3	+ 2.8
Y. Y.	14	1	40.00	146.6	— 5	+2	1,270	— 2.2	— 4.9
I. O.	14	2	34.00	145.0	—15	+5	1,206	+ 6.1	— 6.2
T. K.	14	3	42.20	147.7	0	0	1,047	—18.0	—16.5
A. S.	14	8	36.70	142.5	— 8	+2	1,129	— 4.7	— 3.4
Average					8	+3	1,150	— 2.2	— 5.0

The Average Height and Weight for Japanese Children from 12 to 15 years of Age

Age, Yr.	Body Weight, Kg. Boys	Body Weight, Kg. Girls	Body Height, Cm. Boys	Body Height, Cm. Girls
12	30.1	31.0	133.9	135.1
13	34.0	35.2	140.0	140.3
14	39.3	39.6	147.3	144.8
15	44.8	43.1	152.7	147.6

decreased with advancing age. The results obtained by comparing the data obtained in my tests on high school children with the Talbot standards (new data [13]) are shown in table 5.

Most of the high school children had a total heat production below the Talbot standards (though the rates in Talbot's new data are higher than the Benedict and Talbot standards, the data obtained in my tests for preschool and elementary school children are still higher than the

13. Talbot, F. B.; Wilson, E. B., and Worcester, J.: Standards of Basal Metabolism of Girls (New Data) and Their Use in Clinical Practice, J. Pediat. **7**:655 (Nov.) 1935.

former). The percentage of deviation, which was observed to be highly positive for preschool children, decreased with advancing age, until that for high school children was rather negative.

CONCLUSIONS

The basal heat production of twenty-three high school children, ten boys and thirteen girls, between the ages of 12 years and 1 month and 15 years and 3 months has been studied.

Though a general view of the basal metabolism at puberty can be gained by comparing the average number of calories per square meter per hour as calculated by various authors, great discrepancy exists between their results. It is indispensable that a larger number of children be studied at puberty than at other ages in order that normal standards of basal metabolism may be established, because individual variations in pubertal growth are large.

Which physical factor (body weight, height or surface area) is the best unit for the expression of heat production has not been conclusively demonstrated.

In comparison with the Talbot standards, the total heat production of Japanese high school children was found to be low.

GROWTH AND BASAL METABOLISM

VI. CHANGES IN THE BASAL METABOLISM OF CHILDREN DURING PUBERTY

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In a previous paper [1] entitled "Changes in the Basal Metabolism of Children During a Year," I reported that for girls the rate of increase was higher at the ages of 11 and 12 years than at the earlier ages. It follows that special consideration is necessary for the basal metabolism at puberty, which constitutes an important part of studies on growth and basal metabolism.

Before proceeding with my report, I shall make a brief survey of the literature on basal metabolism and puberty to indicate the general tendency of the studies. Du Bois,[2] in 1916, and Olmstead, Barr and Du Bois,[3] in 1918, were the first to direct special attention to the variation of the basal metabolism at puberty. They determined the basal metabolism of boy scouts at intervals of two years and reported that there was a rise in the basal metabolic rate at the ages from 12 to 14, just at the onset of puberty. On the other hand, Benedict and Talbot [4] found no such increase, and Sandiford and Harrington [5] in their preliminary report noted a decrease in calories per square meter per hour for both boys and girls which was nearly, if not absolutely, a linear accompaniment of age.

Since these reports, the problem has become the most interesting one in studies on basal metabolism, and a large number of reports have been published. Göttche [6] noted that in about half the children the basal metabolism rose at puberty. Lax and Petényi,[7] concluding that at

1. Nakagawa, I.: Growth and Basal Metabolism: IV. Changes in the Basal Metabolism of Children During a Year, Am. J. Dis. Child. **49**:1232 (May) 1935.
2. Du Bois, E. F.: Clinical Calorimetry: XII. The Metabolism of Boys Twelve and Thirteen Years Old Compared with the Metabolism at Other Ages, Arch. Int. Med. **17**:887 (June) 1916.
3. Olmstead, W. H.; Barr, D. P., and Du Bois, E. F.: Clinical Calorimetry: XXVII. Metabolism of Boys Twelve and Fourteen Years Old, Arch. Int. Med. **21**:621 (May) 1918.
4. Benedict, F. G., and Talbot, F. B.: Metabolism and Growth from Birth to Puberty, Publication 302, Carnegie Institution of Washington, 1921.
5. Sandiford, L., and Harrington, E. R.: J. Biol. Chem. **63**:xxxv, 1925.
6. Göttche, O.: Monatschr. f. Kinderh. **32**:22, 1926.
7. Lax, H., and Petényi, G.: Monatschr. f. Kinderh. **36**:381, 1927.

puberty the basal metabolism showed a conspicuous rise, obtained results which agreed more nearly with the Sage curve than with the standards of Benedict and Talbot. Rosenblüth [8] found the largest variations in metabolism between the ages of 14 and 16 and ascribed them to the effect of puberty. Molitch and Cousins [9] made basal metabolic studies on two hundred boys whose ages ranged from 9 to 18, the greater number being between 12 and 16, and reported that their figures, although they did not show a definite increase, proved an irregularity in decrease with relation to puberty. Topper and Mulier [10] reported that children of abnormal body weight, whether overweight or underweight, had a basal metabolic rate above the upper normal limit of plus 10 per cent between the ages of 12 and 14 years. According to Bedale,[11] who examined a large number of boys and girls in a boarding school in England, and MacLeod,[12] who made basal metabolism tests on forty-three girls attending a day school in New York, there was a rise in metabolism prior to puberty and a fall after puberty. But the increase in metabolism occurred a year earlier in the English girls, and it has been suggested that this might be due to the fact that the "age of maximum of the adolescent cycle" of growth occurred a year earlier in them. Blunt, Tilt and others [13] determined the basal metabolism of forty-six girls varying in age from 8 to 18, on twenty-two of whom tests were made repeatedly during a second year and on fifteen during a third, and reported that neither their average figures for the different ages nor the variations by year in each girl, which were few, showed any effect of puberty.

The question of metabolism just prior to and just after puberty has not yet been settled. To my thinking it will be definitely solved only by the observation of a greater number of children at puberty than at the other ages, probably because the progress of physical and physiologic growth at puberty varies greatly with individual children. Du Bois [14] said: "Personally I believe that there is a rise in metabolism before puberty, with a subsequent fall, but the proof will come only when a

8. Rosenblüth, A.: Ztschr. f. Kinderh. **46**:531, 1928.

9. Molitch, M., and Cousins, R. F.: Variation of Basal Metabolism Rate per Unit Surface Area with Age, J. Nutrition **8**:247, 1934.

10. Topper, A., and Mulier, H.: Basal Metabolism in Children of Abnormal Body Weight: II. In Underweight Children, Am. J. Dis. Child. **38**:299 (Aug.) 1929.

11. Bedale, E. M.: Proc. Roy. Soc., London, s.B **94**:368, 1923.

12. MacLeod, G.: Studies of the Normal Basal Energy Requirement, Inaug. Dissert., New York, Columbia University Press, 1924.

13. Blunt, K.; Tilt, J.; McLaughlin, L., and Gunn, K. B.: The Basal Metabolism of Girls, J. Biol. Chem. **67**:491, 1926.

14. Du Bois, E. F.: Basal Metabolism in Health and Disease, Philadelphia, Lea & Febiger, 1927.

number of individual boys and girls are studied every year, or better every six months, between the ages of 10 and 16 years." The aforementioned reports consist of the mass observation of children of different ages but not of the observation of individual children throughout several years. The latter method of observation has hardly been developed, owing to the fact that it requires patience on the part of the children in submitting themselves to the tedious experiments and ardor on the part of the investigator in overcoming many difficulties over a period of years. I have found only one report on observations of this type, that of Topper and Mulier,[15] and the same apparatus was not used in all the experimental periods. The Krogh respirometer was used at first and later the Benedict-Roth apparatus. These authors studied the basal metabolism of thirty-eight children from 10 to 16 years of age at intervals of from six months to a year over a period ranging from one to four years, and they concluded that the basal metabolic rate increased in the prepubescent period, reaching its maximum around the time when catamenia was established in girls and sexual maturity in boys, and subsequently declined.

With these observations in view, I have devoted myself to expressing the changes in the basal metabolism of Japanese children during puberty, as a part of my studies on growth and basal metabolism.

METHOD

Twenty-four children, ten boys aged from 3 years and 7 months to 13 years and 4 months and fourteen girls aged from 8 years and 11 months to 13 years and 2 months, served as subjects. The basal metabolism, together with the body weight and height, of individual children was studied every six months throughout the pubertal period. All the tests were conducted in the spring and autumn with a view to excluding the seasonal influence on the metabolic rate, the rate being low in summer and high in winter. Benedict's respiration apparatus, with a cot chamber, was employed for measuring the heat production throughout the experimental period. The experimental method has been described in detail in the previous papers.

RESULTS AND COMMENT

A summary of the findings is given in table 1.

Yearly Increase in Total Heat Production at Different Ages with Relation to Puberty.—I determined the yearly increase in total heat production between the ages of 4 and 12 years. For the group as a whole there was an increase of about 30 calories in the total amount of heat produced annually. For girls, however, the rate of increase was higher at the ages of 11 and 12 years, perhaps because of the influence of the increase in the rate of growth at puberty.

15. Topper, A., and Mulier, H.: Basal Metabolism of Normal Children: The Puberty Reaction, Am. J. Dis. Child. **43**:327 (Feb.) 1932.

TABLE 1.—*Results of Experiments*

Boys

Date of Experiment	Age Yr.	Age Mo.	Weight, Kg.	Height, Cm.	Sitting Height, Cm.	Oxygen Consumed, Liters	Respiratory Quotient	Nitrogen Excreted in Urine, Gm.	Calories Per Hour per Sq. M.	Calories Per Day Per Kg.	Calories Per Day Total
To. S. (Born Feb. 5, 1923)											
9/ 4/32	9	7	23.90	128.3	71.0	9.372	0.91	0.3918	48.59	45.38	1,085
5/ 7/33	10	3	25.10	130.3	71.3	9.545	0.84	0.3653	46.65	43.27	1,086
9/ 4/33	10	7	25.45	133.4	72.5	9.710	0.88	0.3860	47.00	43.88	1,117
5/15/34	11	3	27.80	136.5	74.5	9.794	0.96	0.6972	44.99	40.39	1,123
10/17/34	11	8	28.85	138.9	75.2	9.556	0.95	0.5081	43.16	38.42	1,108
4/ 3/35	12	2	31.15	141.3	77.0	11.410	0.88	0.5301	48.48	41.84	1,303
I. S. (Born July 31, 1921)											
5/15/32	10	9	30.70	141.8	....	11.432	0.83	0.2032	48.83	42.75	1,313
11/21/32	11	4	31.85	144.6	78.5	11.341	0.86	0.3701	47.12	40.83	1,301
6/ 4/33	11	10	33.95	148.4	78.7	11.453	0.89	0.3475	45.78	39.16	1,329
6/10/34	12	10	38.85	154.0	81.5	12.812	0.86	0.4239	46.72	37.80	1,469
10/ 7/34	13	2	40.50	156.1	83.2	13.848	0.82	0.4097	48.70	38.96	1,578
4/21/35	13	9	43.20	161.2	84.8	13.111	0.88	0.4008	44.37	35.01	1,512
10/13/35	14	2	45.50	164.7	87.4	13.891	0.93	0.3963	46.06	35.72	1,625
4/ 3/36	14	8	48.85	167.6	88.8	13.845	0.96	0.3600	44.28	33.50	1,637
K. S. (Born Jan. 30, 1921)											
7/ 3/33	12	5	25.90	132.2	70.9	8.286	0.88	0.3048	40.12	36.81	953
12/ 3/33	12	10	27.50	133.7	71.0	9.663	0.92	0.4090	45.75	40.72	1,120
5/27/34	13	4	29.65	136.1	72.5	9.206	0.89	0.3759	41.20	35.68	1,058
11/ 5/34	13	9	31.10	137.8	73.4	9.694	0.90	0.5146	42.11	35.75	1,112
4/16/35	14	3	33.10	140.9	75.0	10.260	0.96	0.5066	43.24	36.06	1,194
10/15/35	14	9	37.00	145.7	78.5	10.566	1.01	0.4441	42.20	33.67	1,246
4/ 7/36	15	2	42.75	150.7	80.5	12.285	0.98	0.4087	44.80	33.95	1,452
K. K. (Born Jan. 21, 1921)											
6/20/33	15	5	44.35	152.4	84.6	12.773	0.91	0.4051	44.81	33.46	1,484
11/26/33	12	10	45.10	157.0	87.3	12.808	1.05	0.4362	44.85	33.89	1,528
5/ 8/34	13	4	49.50	158.6	87.7	13.234	0.87	0.2897	42.86	30.96	1,533
10/23/34	13	9	50.50	159.8	87.7	13.126	0.94	0.7854	41.72	29.94	1,512
4/15/35	14	3	47.80	161.0	88.8	12.613	0.92	0.5563	41.02	30.48	1,457
10/14/35	14	9	47.70	161.6	89.7	14.711	0.82	0.5499	46.96	34.97	1,668
4/ 4/36	15	2	49.05	162.7	90.4	13.334	1.00	0.4874	43.52	32.15	1,577
T. N. (Born Jan. 10, 1921)											
6/19/33	12	5	31.10	146.2	78.0	11.072	0.85	0.2830	46.14	40.95	1,273
11/16/33	12	10	33.45	148.7	80.3	11.114	0.93	0.4073	44.93	38.69	1,294
5/ 7/34	13	4	35.55	153.2	82.0	11.665	0.91	0.3710	44.82	38.12	1,355
10/23/34	13	9	38.90	157.8	84.2	12.761	0.85	0.3732	45.52	37.63	1,464
4/15/35	14	3	42.35	162.7	86.4	13.614	0.86	0.5809	45.59	36.69	1,554
10/15/35	14	9	47.20	166.7	88.5	12.994	0.94	0.4576	42.16	32.37	1,528
4/ 4/36	15	3	49.20	168.8	90.4	14.995	0.83	0.4411	46.03	34.80	1,712
M. G. (Born Jan. 1, 1921)											
6/19/33	12	6	30.60	145.1	79.2	9.918	0.87	0.2745	41.89	37.46	1,146
11/16/33	12	11	32.75	147.6	79.5	10.504	0.90	0.3722	42.97	37.15	1,217
5/19/34	13	5	35.50	151.0	82.5	10.672	0.96	0.4514	41.63	35.18	1,249
10/29/34	13	10	38.10	155.2	84.5	11.587	0.85	0.4941	41.97	34.63	1,320
4/23/35	14	4	42.00	159.6	86.9	12.155	0.94	0.5065	42.50	33.75	1,418
10/19/35	14	10	43.70	162.5	88.5	11.986	0.93	0.5218	40.59	31.88	1,393
K. H. (Born Nov. 24, 1920)											
6/26/33	12	7	25.20	137.4	74.4	7.691	1.02	0.2491	37.73	36.30	915
11/14/33	13	0	26.90	138.2	74.8	8.899	0.92	0.4282	41.13	38.16	1,026
5/14/34	13	6	28.35	139.9	75.4	8.818	0.94	0.3310	40.03	36.26	1,028
11/ 4/34	13	11	29.40	141.5	76.7	9.915	0.87	0.3544	43.15	38.75	1,129
5/ 7/35	14	5	32.30	144.7	78.0	10.366	0.86	0.4046	42.60	36.72	1,186
10/14/35	14	11	36.40	149.8	80.7	11.236	0.85	0.3877	42.90	35.35	1,287
4/ 3/36	15	4	40.95	154.9	83.4	12.109	0.89	0.4441	43.09	34.09	1,396
T. I. (Born Nov. 21, 1920)											
7/ 4/33	12	7	35.90	153.1	81.4	12.345	0.80	0.3439	46.27	38.97	1,399
11/28/33	13	0	38.55	156.8	82.9	13.089	0.80	0.3722	46.46	38.47	1,483
5/27/34	13	6	42.55	161.3	85.8	12.620	0.84	0.3309	42.78	34.02	1,448
11/ 4/34	13	11	44.50	165.8	87.7	12.441	0.93	0.3811	41.27	32.71	1,456
4/22/35	14	5	48.50	169.4	89.7	13.144	0.91	0.4362	41.36	31.52	1,529
10/16/35	14	11	49.90	172.5	91.2	13.414	0.89	0.4552	40.86	31.05	1,549
4/ 7/36	15	5	52 20	173.6	92.5	14.148	0.84	0.5419	41.41	30.84	1,610
T. K. (Born May 19, 1920)											
6/26/33	13	1	37.20	144.8	79.7	12.208	0.83	0.3160	47.24	37.49	1,395
11/13/33	13	6	40.35	149.9	82.0	13.033	0.81	0.4082	46.98	36.61	1,477
5/14/34	14	0	43.40	153.8	85.0	11.942	0.90	0.3404	42.30	32.05	1,391
10/29/34	14	5	46.90	157.0	87.2	12.621	0.86	0.4571	41.87	30.85	1,447
4/16/35	14	11	42.15	157.9	87.2	11.301	0.87	0.3820	39.26	30.85	1,300
M. Y. (Born Feb. 26, 1920)											
6/27/33	13	4	34.10	143.4	76.0	10.167	0.88	0.3945	41.32	34.32	1,170
11/28/33	13	9	35.85	145.7	78.8	10.782	0.86	0.3455	42.25	34.50	1,237
5/28/34	14	3	39.70	149.9	81.0	10.748	0.94	0.3841	40.30	31.67	1,257
11/ 5/34	14	8	42.60	154.7	83.5	11.141	0.94	0.4580	39.47	30.46	1,298
5/11/35	15	3	46.35	159.7	85.7	12.210	0.86	0.4651	40.17	30.16	1,398

TABLE 1.—*Results of Experiments—Continued*

Girls

Date of Experiment	Age Yr.	Age Mo.	Weight, Kg.	Height, Cm.	Sitting Height, Cm.	Oxygen Consumed, Liters	Respiratory Quotient	Nitrogen Excreted in Urine, Gm.	Calories Per Hour per Sq. M.	Calories Per Day Per Kg.	Calories Per Day Total
H. H. (Born Jan. 2, 1924)											
11/22/32	8	11	22.80	125.8	70.8	8.413	0.95	0.3941	45.38	42.99	980
4/ 9/33	9	3	24.35	127.9	71.8	8.619	0.91	0.3816	44.04	40.80	994
10/ 1/33	9	9	25.10	130.4	72.8	8.589	0.95	0.3132	43.23	40.09	1,006
4/30/34	10	4	27.95	134.2	74.7	9.486	0.87	0.3595	44.03	38.94	1,088
9/24/34	10	9	28.35	136.7	75.7	9.467	0.88	0.4546	42.94	38.17	1,082
4/29/35	11	4	31.45	141.1	78.7	9.607	0.97	0.4351	41.43	35.73	1,124
4/ 5/36	12	3	35.40	146.5	81.1	11.008	0.91	0.4029	43.61	36.07	1,277
F. M. (Born Dec. 6, 1922)											
10/23/32	9	11	24.00	129.7	70.5	8.196	0.84	0.3600	41.21	38.79	931
5/ 2/33	10	5	26.05	131.7	72.0	8.421	0.87	0.4343	40.26	36.72	957
10/23/33	10	11	27.75	136.6	74.3	8.202	0.92	0.4591	37.79	33.99	943
M. S. (Born July 30, 1922)											
10/30/32	10	3	32.55	140.0	74.4	9.137	0.95	0.4163	39.27	32.92	1,065
4/23/33	10	9	33.80	142.7	75.9	9.398	0.89	0.3374	38.67	32.12	1,086
11/ 5/33	11	3	35.70	146.1	77.2	10.151	0.85	0.3380	39.99	32.53	1,161
4/30/34	11	9	37.70	149.7	78.5	9.321	0.95	0.2810	35.94	29.06	1,096
10/ 7/34*	12	2	40.50	153.0	79.7	10.614	0.91	0.3077	38.80	30.58	1,238
4/21/35	12	9	45.10	156.6	82.5	11.098	0.90	0.4551	37.49	28.33	1,278
10/13/35†	13	2	46.80	159.5	83.3	11.320	0.88	0.3655	37.29	27.92	1,307
Se. N. (Born May 5, 1922)											
5/22/32	10	1	25.00	135.4	....	9.257	0.85	0.3291	44.96	42.30	1,057
11/27/32	10	7	26.75	139.9	77.6	9.408	0.89	0.3513	43.43	40.53	1,084
6/20/33	11	1	30.60	145.5	79.8	9.526	0.89	0.4571	39.87	35.65	1,091
10/ 8/33	11	5	30.90	147.8	81.5	9.123	0.99	0.4077	38.47	34.66	1,071
4/27/34‡	12	0	35.10	152.0	84.2	10.514	0.88	0.4093	40.59	34.41	1,208
K. T. (Born Dec. 25, 1921)											
4/16/33	11	4	24.65	129.8	71.0	8.352	0.90	0.3681	41.80	39.07	963
10/22/33	11	10	27.95	135.0	75.0	9.018	0.92	0.3286	41.99	37.50	1,048
4/22/34	12	4	29.45	137.8	76.6	8.988	0.99	0.3232	40.95	36.04	1,062
9/23/34	12	9	31.25	141.2	78.1	9.847	0.83	0.2890	41.84	35.99	1,125
4/ 3/35*	13	3	33.75	143.6	79.9	9.942	0.91	0.3729	41.04	34.15	1,152
S. S. (Born March 3, 1921)											
5/15/32	11	2	29.80	136.9	....	9.760	0.82	0.2744	42.95	37.36	1,113
11/21/32	11	9	31.55	141.1	....	9.713	0.88	0.2904	41.35	35.52	1,121
4/ 3/33	12	1	34.35	142.8	78.2	10.413	0.84	0.3246	42.04	34.66	1,191
K. S. (Born June 16, 1921)											
5/13/34	12	11	31.20	135.2	75.1	8.566	0.91	0.2713	38.13	31.97	997
10/28/34	13	4	33.85	138.8	76.4	8.783	0.87	0.3466	36.47	29.74	1,007
5/ 5/35	13	11	35.75	141.8	77.8	8.205	0.85	0.3612	32.69	26.11	934
K. N. (Born Oct. 16, 1921)											
10/17/32	11	0	27.50	140.6	76.5	8.082	0.91	0.2394	36.96	34.19	940
5/ 6/34	12	7	34.90	148.9	80.2	9.942	0.85	0.3608	38.77	32.53	1,135
10/21/34	13	0	37.10	152.4	81.5	10.304	0.88	0.3712	38.61	31.97	1,186
4/28/35‡	13	6	39.10	156.4	83.5	9.958	0.86	0.3679	35.75	29.19	1,141
4/ 5/36	14	6	45.40	160.9	86.0	11.657	0 86	0.4892	37.98	29.11	1,322
Ma. S. (Born Jan. 1, 1922)											
5/ 6/34‡	12	4	27.10	130.3	70.5	9.308	0.91	0.3913	44.88	39.75	1,077
10/21/34	12	10	30.00	134.2	72.2	9.229	0.91	0.4758	41.73	35.38	1,062
5/ 5/35	13	4	32.80	137.0	74.3	9.820	0.86	0.4132	41.71	34.19	1,121
Y. Y. (Born March 23, 1921)											
10/17/33	12	7	29.75	139.0	75.9	9.798	0.86	0.2311	43.22	38.00	1,131
4/15/34*	13	1	35.50	141.9	78.2	10.484	0.88	0.4255	42.11	33.88	1,203
9/16/34	13	6	32.80	144.6	78.8	10.915	0.84	0.2864	44.59	38.17	1,252
4/14/35	14	1	40.00	146.6	80.4	11.023	0.88	0.4172	41.33	31.74	1,270
10/17/35	14	7	39.30	148.9	80.7	10.526	0.91	0.2559	39.73	31.30	1,230
K. U. (Born March 1, 1921)											
10/17/33	12	8	24.80	134.6	71.8	7.535	0.89	0.2886	36.90	34.99	868
4/15/34	13	1	27.40	135.8	73.1	8.775	0.84	0.2871	40.55	36.59	1,002
10/14/34	13	7	29.50	140.1	75.2	9.167	0.86	0.3648	39.99	35.46	1,046
4/ 7/35	14	1	33.50	143.2	80.3	9.549	0.91	0.4209	39.28	32.93	1,103
10/17/35	14	8	34.30	146.3	80.3	9.186	0.93	0.2581	37.32	31.33	1,075
I. O. (Born Feb. 18, 1921)											
10/15/33	12	8	29.20	139.1	74.8	8.641	0.91	0.3145	38.68	34.33	1,002
4/ 8/34	13	2	32.00	141.3	77.4	9.136	0.93	0.3610	38.87	33.23	1,063
9/ 9/34*	13	7	31.30	143.3	77.5	9.158	0.91	0.3182	38.88	33.98	1,064
4/14/35	14	2	34.00	145.0	78.2	10.435	0.88	0.3165	42.24	35.48	1,206
10/20/35	14	8	33.95	146.6	80.9	9.294	0.92	0.3396	37.58	31.88	1,082
T. K. (Born Jan. 10, 1921)											
10/22/33*	12	9	38.30	145.1	77.0	8.970	0.88	0.4037	34.25	26.83	1,027
4/22/34	13	3	40.40	146.2	79.6	8.780	0.87	0.3368	32.84	24.97	1,009
10/17/34	13	9	41.50	147.6	81.2	8.582	0.91	0.3637	31.57	23.92	993
4/ 5/35	14	3	42.20	147.7	81.8	9.142	0.89	0.4607	33.05	24.81	1,047
A. S. (Born Aug. 13, 1920)											
10/15/33	13	2	30.00	136.1	76.7	10.056	0.83	0.3115	44.26	38.24	1,147
4/ 8/34*	13	8	32.25	138.6	78.1	10.502	0.85	0.3544	44.78	37.32	1,204
10/14/34	14	2	34.90	141.4	78.1	10.152	0.90	0.3695	41.50	33.68	1,175
4/ 7/35	14	8	36.70	142.5	79.3	9.691	0.92	0.3210	38.89	30.77	1,129
10/20/35	15	2	37.00	144.3	79.3	9.465	0.90	0.3145	37.13	29.62	1,096
4/11/36	15	8	39.95	145.3	80.4	9.892	0.96	0.2948	38.31	29.23	1,168

* Breasts have developed.
† Underlining indicates that catamenia has been established.
‡ Breasts have commenced to grow.

The annual increase in the total heat production of individual boys and girls during puberty is shown in table 2. The increase was more than 50 calories, and at the period of maximum of pubescence it amounted to over 100 calories. This sudden change in basal metabolism occurred, though it varied with individual children, at the age of 11 or 12 years in boys and of 10 or 11 years in girls, which is consistent with the fact that girls attain puberty earlier than boys do, and it seemed to

TABLE 2.—*Yearly Increase in Total Heat Production, Calories*

Age, years	9-10	10-11	11-12	12-13	13-14	14-15	15-16
Boys							
To. S.	..	34	86	...	...	...	..
I. S.	..	..	22	195	45	68	..
K. K.	..	..	..	47	— 46	138	..
K. S.	..	..	..	136	64	196	..
T. N.	..	..	..	52	184	111	..
M. G.	..	..	..	87	136	24	..
K. H.	.	..	..	...	173	179	..
T. I.	..	..	..	...	150	87	..
T. K.	..	..	..	...	— 18	—119	..
M. Y.	..	..	..	...	77	1	..
Girls							
H. H.	60	56	174	...	...	...	..
F. M.	..	— 1	..	...	...	...	..
M. S.	..	59	43	126	...	...	..
Se. N.	..	25	126	...	...	...	..
K. T.	..	..	92	84	...	...	..
S. S.	..	..	43	...	...	...	..
K. S.	..	..	..	...	— 68	...	..
K. N.	..	..	..	...	168	...	..
Ma. S.	..	..	..	15	...	...	..
Y. Y.	..	..	..	...	75	— 40	..
K. U.	..	..	..	...	140	0	..
I. O.	..	..	..	...	102	— 53	..
T. K.	..	..	..	...	2	...	..
A. S.	..	..	..	...	43	— 77	55

TABLE 3.—*Yearly Increase in Weight, Height and Total Heat Production*

Age, years	9-10	10-11	11-12	12-13	13-14	14-15	15-16
Boys							
Number	.....	1	2	5	9	9	.....
Calories	.....	34	54	103	85	76	.....
Weight, Kg.	.....	2.13	3.02	3.66	4.85	4.09	.....
Height, cm.	.....	5.7	5.2	4.8	6.7	6.1	.....
Girls							
Number	1	4	5	3	7	4	1
Calories	60	22	96	75	66	—43	55
Weight, Kg.	2.95	3.22	4.56	4.98	4.63	1.67	3.10
Height, cm.	5.4	6.5	6.8	6.0	4.9	3.2	1.9

come to an end at the age of 15 or 16 years in boys and 14 or 15 years in girls. In any case, it is clear that the rate of increase in basal metabolism was higher at puberty than at the adjacent ages.

The average annual increase in weight, height and total heat production of all the children for the different age periods is shown in table 3. In boys the maximum increase in weight and height occurred between the ages of 13 and 14 and that in total heat production between the ages of 12 and 13. In girls the maximum increase in weight occurred between the ages of 12 and 13 and that in height and in total heat

production between the ages of 11 and 12. Thus the maximum increase in total heat production occurred before the maximum increase in weight in both girls and boys and before the maximum increase in height in boys.

Relation of Total Heat Production to Weight, Height, Surface Area and Sitting Height.—In my previous paper [16] I discussed which physical factor (body weight, height or surface area) is the best unit for calculation of the heat produced by children at puberty, but I could not bring the matter to a definite conclusion. I also calculated the coefficients of correlation between the total heat production and the weight, height, surface area and sitting height of all the children employed in the present experiment. However, as shown in table 4, I could not determine which criterion is the best for expressing the total heat production. For the

TABLE 4.—*Correlation Coefficients Between the Total Amount of Heat Produced and the Weight, Height, Body Surface and Sitting Height*

Name	Weight	Height	Surface Area	Sitting Height
Boys				
To. S.	0.8154±0.0923	0.7362±0.1261	0.7843±0.1060	0.7949±0.1014
I. S.	0.9568±0.0202	0.9451±0.0394	0.9529±0.0220	0.9400±0.0297
K. S.	0.9033±0.0469	0.9271±0.0358	0.9400±0.0297	0.8953±0.0506
K. K.	0.1792±0.2467	0.4686±0.1990	0.3074±0.2309	0.5660±0.1733
T. N.	0.9545±0.0227	0.9588±0.0206	0.9572±0.0214	0.9659±0.0171
M. G.	0.9786±0.0116	0.9725±0.0149	0.9752±0.0135	0.9588±0.0222
K. M.	0.9775±0.0113	0.9712±0.0145	0.9784±0.0109	0.9748±0.0127
T. I.	0.8952±0.0506	0.8715±0.0613	0.8873±0.0542	0.8757±0.0594
T. K.	0.1006±0.2986	−0.3384±0.2671	−0.0646±0.3004	−0.3497±0.2648
M. Y.	0.9684±0.0188	0.9597±0.0238	0.9665±0.0199	0.9696±0.0181
Total (65 children)	0.9019±0.0156	0.8910±0.0172	0.9110±0.0142	0.8920±0.0172
Girls				
H. H.	0.9772±0.0115	0.9626±0.0189	0.9701±0.0150	0.9607±0.0197
M. S.	0.9450±0.0273	0.9271±0.0358	0.9351±0.0320	0.9338±0.0326
Se. N.	0.8270±0.0953	0.7412±0.1359	0.7650±0.1251	0.7746±0.1349
K. T.	0.9871±0.0077	0.9906±0.0056	0.9877±0.0074	0.9880±0.0072
K. N.	0.9683±0.0188	0.9321±0.0396	0.9587±0.0244	0.9269±0.0425
Y. Y.	0.7323±0.1399	0.8109±0.1033	0.7738±0.1210	0.8717±0.0724
K. U.	0.9085±0.0527	0.8320±0.0928	0.8945±0.0603	0.8569±0.0801
I. O.	0.8080±0.1047	0.6607±0.1700	0.7606±0.1271	0.4640±0.2367
A. S.	−0.2802±0.4288	−0.3691±0.2378	−0.3487±0.2419	−0.2292±0.2609
Total (66 children)	0.6367±0.0494	0.6640±0.0464	0.6690±0.0459	0.6789±0.0458

individual children I calculated the coefficients of correlation between the total heat production and the physical factors (table 4). The total heat production of individual boys and girls had a closer relation to each of the physical factors than that obtained in general observations on the cases as a group. It was most closely correlated with the weight except in a few children (K. K. and T. K., boys, and A. S., a girl), for whom, in view of probable errors, there seemed to be no correlation.

Variation of the Basal Metabolic Rate per Unit of Body Weight or Surface Area During Puberty.—The metabolic rate expressed in relation to weight or surface area decreased in inverse proportion to age. In terms of puberty, however, an increase in the basal metabolic rate or

16. Nakagawa, I.: Growth and Basal Metabolism: V. Basal Metabolism of High School Children, Am. J. Dis. Child., this issue, p. 985.

at least an irregularity in its decrease was shown by the individual observations (table 1). On the other hand, such changes are obscured in mass observations of a small number of children because the progress of pubertal growth varies greatly with individual children.

Thus the increase in the basal metabolic rate or the irregularity in its decrease at puberty is probably due to the fact that the increase in total heat production which takes place at puberty reaches its maximum before the increase in weight and in height reach their maximum. A subsequent abrupt decrease in the basal metabolic rate seems to be caused by the suspension of the increase in total heat production which occurs prior to the suspension of the increase in body weight and height.

Although the age at which the maximum increase in the basal metabolic rate or an irregularity in its decrease occurs varies with individual children, the average is 14 years for boys and 13 years for girls—before sexual maturity is established in boys and catamenia in girls (table 1).

TABLE 5.—*Age at Onset of Catamenia*

Name	Years	Months
M. S.	13	6
K. T.	13	2
K. N.	14	4
Y. Y.	14	9
K. U.	14	10
I. O.	15	0
T. K.	13	4
A. S.	15	9
Average	14	4

In girls this change in the basal metabolism occurs earlier than it does in boys, which is consistent with their earlier pubescence, and comes at just about the period in which the breasts grow larger. According to the results obtained in England and America, it occurs at the age of 14 in American boys (Topper and Mulier), at the age of 11 in English girls (Bedale) and at the age of 12 in American girls (MacLeod and Topper and Mulier). These ages are somewhat younger than those at which it occurs in Japan.

The average age at which catamenia is said to commence in Japanese girls is 14 years and 2 months. The average age at which it was established in the girls employed in the present experiment was 14 years and 4 months, though it varied from 13 years and 2 months to 15 years and 9 months (table 5). The average age for American girls is 13 years and 9 months (Engelmann) and for English girls 14 years and 6 months (Blair and Bell).

Therefore, in American, English and Japanese girls the maximum increase in the basal metabolic rate or an irregularity in its decrease occurs before the appearance of catamenia. The maximum increase in

the metabolic rate, like the onset of the catamenia, occurs earlier in American girls than in Japanese girls. However, in English girls, in whom catamenia begins later than it does in Japanese girls, the maximum increase is reached earlier than it is in Japanese girls.

There seemed to be no uniformity in the height of the increase in the metabolic rate or in its duration; it varied with individual children.

The increase in the total heat production is one of the many physiologic manifestations of pubescence and probably occurs in preparation for the physical changes at puberty, preceding the pubertal increase in body weight and height and the development of the secondary sexual characteristics.

CONCLUSIONS

The basal metabolism, together with the body weight and height, of twenty-four children, ten boys and fourteen girls, was studied every six months throughout the pubertal period.

At puberty, there is a higher increase in the total heat production (at its maximum it amounts to above 100 calories a year) as well as in weight and height. This increase begins at the age of 11 or 12 years in boys and of 10 or 11 years in girls, which is consistent with the fact that girls attain puberty earlier than boys do; it reaches its maximum at the age of 12 or 13 years in boys and of 11 or 12 years in girls, and it ends, before the increase in weight and height does, at the age of 15 or 16 years in boys and of 14 or 15 years in girls.

I calculated the coefficients of correlation between the total heat production and the weight, height, surface area and sitting height by using one hundred and thirty-one sets of data obtained in the present experiment. Which physical factor is the best for expressing the amount of the heat produced has not been ascertained; nevertheless, in the individual children the weight was most closely correlated with the total heat production.

The increase in the metabolic rate or the irregularity in its decrease per unit of weight or surface area may be due to the fact that total heat production increases greatly at puberty and that this increase reaches its maximum earlier than does the increase in weight or height.

Though the age at which this increase in the basal metabolic rate or an irregularity in its decrease reaches the maximum varies with individual children, the average is 14 for boys and 13 for girls, which is consistent with the earlier pubescence of girls. That is, the maximum is reached before the sexual maturity is established in boys and catamenia in girls. There seemed to be no uniformity in the height of the increased metabolic rate or in its duration; it varied with individual children.

The increase in the total heat production probably occurs in preparation for the physical changes which take place at puberty.

THE PRECORDIAL LEAD OF THE ELECTROCARDIOGRAM OF NORMAL CHILDREN

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In recent years the precordial lead of the electrocardiogram has been found valuable in the diagnosis of myocardial involvement in adults.[1] The criteria for normal adults have been established,[2] but it seemed possible that these might not be accurate for children because of the anatomic differences in the chest. We therefore studied a series of normal children and in 1935 published a preliminary report[3] of our findings. A significant variation from the tracings of adults appeared

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From the Cardiographic Laboratory of the Mount Sinai Hospital.

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(Footnotes continued on next page)

in the frequent occurrence of an upright T wave,[3a] and in an effort to explain this difference between the records for the two age groups, a further investigation was made.

PROCEDURE

Seventy-one normal children [4] were studied, thirty-six boys and thirty-five girls. The children had been observed carefully in an orphanage for several years and were known to be free from heart disease. No child with a functional murmur was included. The ages ranged from 2 to 15 years. For purposes of comparison the children were divided into three age groups: group A, from 2 to 6 years, nineteen children; group B, from 7 to 10 years, thirty children, and group C, from 11 to 15 years, twenty-two children.

The precordial electrode [2] (Master) consisted of a coil of copper wire inserted into a glass funnel 1 inch (2.5 cm.) in diameter. Contact with the skin was made with a cotton pad moistened in saline solution. The chest electrode was placed in the fourth or fifth interspace, depending on the age of the patient and the size of the chest. With children up to 6 years of age the fourth interspace was used, and with older children, the fifth. The inactive electrode was placed on the left leg. Seven positions on the anterior wall of the chest were used (figs. 1, 2 and 3):

Position 1—2 cm. to the right of the midsternal line
Position 2—the midsternal line
Position 3—2 cm. to the left of the midsternal line
Position 4—4 cm. to the left of the midsternal line
Position 5—6 cm. to the left of the midsternal line
Position 6—8 cm. to the left of the midsternal line
Position 7—10 cm. to the left of the midsternal line

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bloom, A. A.: Clinical Evaluation of Lead IV (Chest Leads): A Survey of Lead IV in Ambulatory Cases of Coronary Artery Disease and Acute Coronary Occlusion, Am. J. M. Sc. **187**:489, 1934. Master, A. M.: The Precordial Lead in One Hundred and Four Normal Adults, Am. Heart J. **9**:511, 1934. Roth, I. R.: On the Use of Chest Leads in Clinical Electrocardiography, ibid. **10**:798, 1935. Shipley, R. A., and Halloran, W. R.: The Four-Lead Electrocardiogram in Two Hundred Normal Men and Women, ibid. **11**:325, 1936.

3. Master, A. M.; Dack, S., and Jaffe, H. L.: Chest Leads in Normal Children, Proc. Soc. Exper. Biol. & Med. **32**:1529, 1935.

3a. In this study of the precordial lead the right arm lead was connected to the chest electrode and the left leg lead to the indifferent electrode. By this arrangement a wave of negative potential is directed upward and one of positive potential downward, the reverse of the procedure for the standard limb leads. The normal precordial lead consists of an initial downward deflection, the Q wave, followed by an upward deflection, the R wave and a downward directed T wave. It has recently been suggested that the lead wires be reversed so that the polarity of the waves in the precordial lead conform to that in the standard leads. The normal precordial lead will then consist of an initial upward deflection, R, followed by a downward deflection, S, and terminally by an upright T wave. It is our belief that this change will be adopted in the near future. In other words, our finding of an upright wave for normal children will be referred to as an inverted T wave. The initial downward deflection, our Q wave, will become the R wave, and our R wave will become the S wave.

4. We were able to study these children through the courtesy of Dr. Samuel Averbuck, physician to the Hebrew Orphan Asylum of New York.

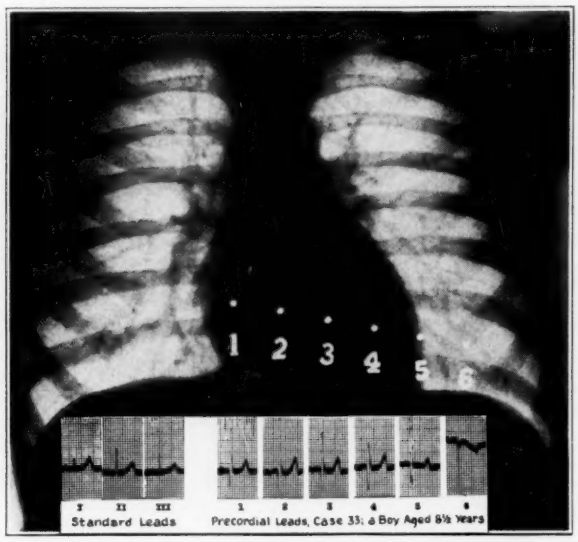

Fig. 1.—Points *1* to *6* on the walls of the chest indicate the exact position of the electrode when the six precordial leads were taken. Upright T waves were present with the electrode between the right of the sternum and the apex.

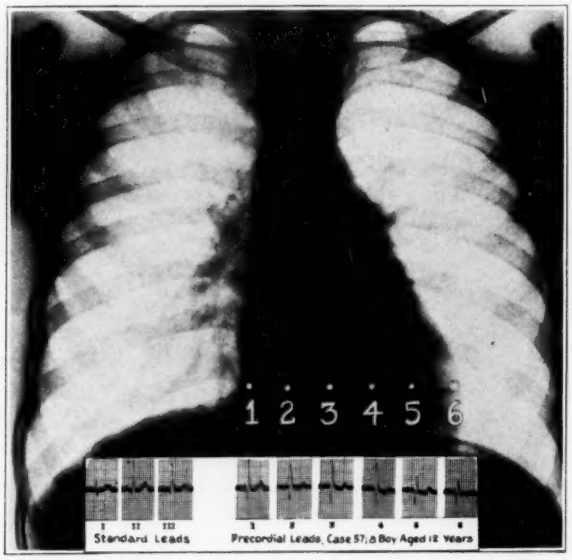

Fig. 2.—A diphasic T wave was present with the electrode in positions 4, 5 and 6, i. e., near the apex. This tracing shows the transition to the adult type of electrocardiogram.

In the younger children the maximum apical impulse was located at position 4 and in the older, at position 5. Records were usually made with the subject recumbent, but to determine the influence of the position of the body on the precordial lead, records were also made for some of the children while they were sitting or standing. The three conventional limb leads were obtained in all cases.

RESULTS

In table 1 the results are summarized. The waves other than the P waves were within the average limits in 90 per cent of the cases. The height of the P waves was average in 75 per cent of the cases.

The P Wave.—The direction of the P wave was most frequently downward, especially when the chest electrode was near the sternum

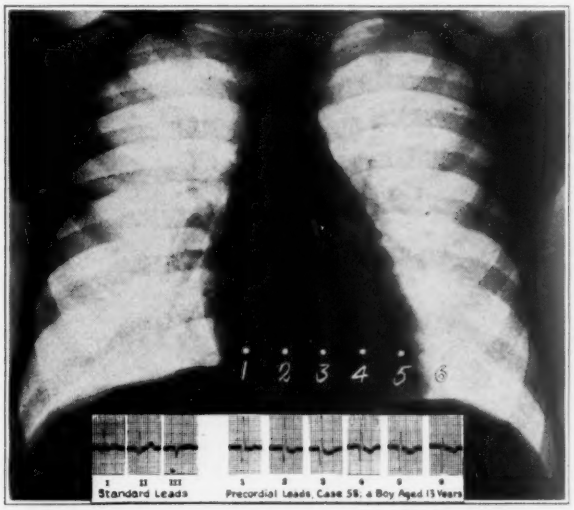

Fig. 3.—The adult type of electrocardiogram; i.e., with the T wave inverted when the electrode is at the left of the sternum, between the sternum and the apex or beyond the apex.

(positions 1, 2 and 3; table 1). When the chest electrode was at the apex (positions 4, 5 and 6) the wave was less frequently inverted. The average height of the P wave varied between — 1 and + 0.5 mm., the limits being from — 1 to + 2 mm. The largest P waves were found when positions 1 and 2 were used, and their size decreased progressively as the electrode was moved toward the apex; when the electrode was at the apex they were frequently absent. The duration of the P wave ranged from 0.02 to 0.06 second.

The PQ Interval.—The average duration of the PQ interval was from 0.10 to 0.14 second in 90 per cent of the cases (table 1). The limits were 0.08 second, in one case, and 0.18 second, in another. This interval was frequently slightly elevated above the iso-electric line irre-

TABLE 1.—*Summary of Data on the Precordial Leads of Seventy-One Normal Children*

	P Wave						PQ Interval						Q Wave						R Wave						QRS Complex						QR-T Transition						T Wave					
Position	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Average height, mm.	−1 +0.5	−1 −0.5	−0.5 0	−0.5 +0.5	−0.5 +0.5	.....	.....						2− 7	2− 12	4− 17	5− 22	5− 22	5− 22	4− 17	8− 22	8− 22	4− 22	2− 17	1− 12	.....						0− +1	0 +1	−1 +1	−1 +0.5	−1 0	0 ..	+2 +5	+1 +5	−1 +5	−3 +4	−4 +3	−5 0
Limits, mm.	−1 +2	−1 +2	−1 +2	−1 +1	−1 +1	−0.5 +1	.....						1− 17	2− 22	1− 22	1− 22	1− 30	1− 33	2− 23	2− 34	2− 30	2− 30	0.5− 40	0− 17	.....						−1 +1	−1 +1	−1 +1	−1 +1	−1 +1	−0.5 +1	−2 +7	−3 +7	−3 +8	−4 +6	−5 +4	−5 +1
Average duration, second	0.04 0.06	0.04 0.06	0.04 0.06	0.04	0.02 0.04	0.02 0.04	0.10 0.14	0.10 0.14	0.10 0.14	0.10 0.14	0.10 0.14	0.10 0.14	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	0.06 0.08	0.07 0.08	0.07 0.08	0.06 0.08	0.06 0.08	0.06 0.08												
Limits, second	0.04 0.08	0.04 0.08	0.02 0.06	0.02 0.06	0.02 0.06	0.02 0.04	0.10 0.18	0.08 0.18	0.08 0.18	0.08 0.18	0.08 0.18	0.08 0.18	... ...	... ...	... ...	... ...	... ...	... ...	.. ...	... ...	... ...	... ...	... ...	... ...	0.06 0.10	0.06 0.10	0.06 0.09	0.05 0.10	0.05 0.09	0.05 0.09												
Negative, percentage of cases	41	63	60	55	43	42	0	0	0	0	0	0	...	...	...	...	...	...	...	...	...	...	...	...	.....						3	8	24	23	20	5	1	3	13	25	62	96
Positive, percentage of cases	15	8	10	15	3	27	90	90	80	50	30	10	...	...	...	...	...	...	...	...	...	...	...	...	.....						36	34	20	9	7	4	97	82	55	30	20	2
Diphasic, percentage of cases	41	27	17	17	10	2	.....						...	...	...	..	...	..	...	...	...	...	...	...	.....						.....						0	10	16	17	3	0
Positive	.....						.....																																			
Equal	.....						.....						...	...	...	...	...	..	...	...	...	...	...	...	.....						.....						0	3	10	14	6	2
Negative	.....						.....						...	...	...	...	...	...	...	...	...	...	...	...	.....						.....						1	3	5	15	9	0
Absent, percentage of cases	3	1	13	12	19	29	.....						0	0	0	0	0	0	0	0	0	0	3	5																		
Slurring, percentage of cases	.....						.....						0	3	2	0	4	7	21	18	15	5	3	2	21	21	17	5	7	9												
Notching and slurring, percentage of cases	.....						.....						3	1	2	6	4	7	20	8	5	14	8	4	23	9	7	20	17	11												
1° upward deflection, percentage of cases	.....						.....						...	...	...	...	...	...	...	...	...	...	...	...	0	0	0	2	15	68												

spective of the direction of the P wave, thus corresponding to the slight depression of the PR interval frequently seen in the standard leads.

The Q Wave.—The size of the Q wave, that is, the initial downward deflection, varied from 2 to 17 mm. when the electrode was over the sternum (positions 1, 2 and 3) and from 5 to 22 mm. when the electrode was at the apex (positions 4, 5 and 6), with limits of 1 and 33 mm. (table 1). A tendency for the Q wave to increase in size as the electrode was moved from the sternum to the apex was thus apparent. This wave was never absent, although it was occasionally very small, from 1 to 2 mm. tall, a fact that emphasizes the significance of the absence of the Q wave in electrocardiograms of adults.[1]

The R Wave.—The height of the R wave ranged from 8 to 27 mm. with the electrode at the sternum (positions 2 and 3) and became less as the electrode approached the apex; when the electrode was at the apex the range was from 2 to 22 mm. (table 1). With the electrode outside the apex (positions 6 and 7) the R wave was occasionally absent. The extreme height, regardless of the location of the electrode, was 40 mm.

The Initial Upward Deflection.—An initial upward deflection frequently preceded the Q wave with the electrode at or outside the apex (positions 5, 6 and 7; table 1). In 68 per cent of the cases it was present when position 6 was used. The height varied from 0.5 to 2 mm.

The QRS Complex.—The average duration of the QRS complex regardless of the position used was from 0.06 to 0.08 second (table 1). In one case it measured 0.1 second and in four cases 0.05. Notching and slurring of the QRS complex were not unusual. The Q wave showed these characteristics when the electrode was over the sternum in 5 per cent of the cases and when it was in the apical region in from 8 to 14 per cent. The R wave was notched and slurred when the electrode was over the sternum in from 30 to 45 per cent of the cases and when it was near the apex in 10 to 20 per cent. Notching may shift from the R wave to the Q wave or vice versa, from beat to beat and as the electrode is moved from one position to the next. The definite diminution in notching and slurring of the R wave as the electrode moves from position 1 to position 6 may be due to the change from the right to the left ventricle. Kossman and Johnston [5] recently suggested that notching in the precordial lead may be produced by the difference in time between the activation of the surfaces of the right and left ventricles.

The RT Transition.—Elevation of the RT transition from 0.5 to 1 mm. above the iso-electric line was present when the electrode was

5. Kossman, C. E., and Johnston, F. D.: The Precordial Electrocardiogram: I. The Potential Variations of the Precordium and of the Extremities in Normal Subjects, Am. Heart J. **10**:925, 1935.

at the sternum in from 20 to 35 per cent of the cases and when it was near the apex in from 4 to 9 per cent (table 1). A depression of this interval of 1 mm. was present with the electrode within the apex (positions 3, 4 and 5) in from 20 to 24 per cent of the cases. No elevation or depression of over 1 mm. was found in any position.

The T Wave.—The principal difference between the precordial lead of children and that of adults lies in the direction of the T wave (table 1). Except in rare instances an upright T wave is abnormal in the electrocardiogram of an adult; for this series of normal children it was a common finding. With the electrode in position 1 it was present in all but two cases (figs. 1, 2 and 3); it decreased progressively in frequency as the electrode moved toward the apex; with the electrode at the apex it occurred in 30 per cent of the cases when position 4 was used and in 20 per cent when position 5 was used. When position 4 or 5 was used it was inverted in 25 or 62 per cent of the cases, respectively; with the electrode beyond the apex, in position 6 or 7, it was nearly always inverted. When the electrode lay within the apex, as it was being moved from the sternum to the apex, the upright T wave frequently became diphasic, and only when the apex was reached (position 5 or 6) did it become completely inverted (fig. 2). A diphasic T wave in which the upright limb was equal to or larger than the inverted limb was present when the electrode was within the apex (position 4) in 31 per cent of the cases and when it was at the apex (position 5) in 9 per cent. Thus an upright or diphasic T wave was present when the electrode was within the apex (position 4) in 61 per cent of the cases and when it was over the apex (position 5) in 29 per cent.

TABLE 2.—*Percentage of Cases in Which a Positive T Wave Was Present*

	Position						
	1	2	3	4	5	6	7
Group A	100	95	73	55	39	9	0
Group B	100	85	60	31	24	0	0
Group C	92	70	35	5	0	0	0
Total	97	82	55	30	20	2	0

The average height of the T wave when the electrode was over the sternum was from 1 to 5 mm. The tallest positive wave was 8 mm. and the deepest negative waves 3 mm. With the electrode at or within the apex the average height was from —4 to +3 mm., the tallest positive wave being 6 mm. and the deepest negative wave being —5 mm.

The direction of the T wave was influenced by age, the frequency of the upright T wave diminishing in the electrocardiograms of the older children (table 2). When position 4 was used an upright T wave

was present in the tracings of 55 per cent of the children in group A (from 2 to 6 years), in the tracings of 31 per cent of those in group B (from 7 to 10 years) and in the tracings of only 5 per cent of those in group C (from 11 to 15 years). Furthermore, an inverted T wave with the electrode over the sternum, which is characteristic of the adult precordial lead, occurred in the tracings of only three children, and these were all over 12 years. An analysis of the T wave in the electrocardiograms of the six oldest children of the series (from 14 to 15 years) showed it to be inverted in every case when the electrode was at the apex, indicating a trend toward the adult type of chest lead.

The Effect of Respiration.—In almost all the cases, the phasic variation in the height, configuration and direction of the QRS complex and of the T wave during respiration was much more definite than that in the electrocardiograms of adults (fig. 4). There was usually a diminution of from 2 to 5 mm. in the height of the Q and of the

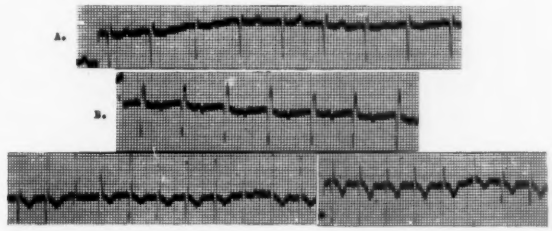

Fig. 4.—The effect of normal respiration on the precordial lead of children: *A* (case 10, position 5) shows variation in the size and the direction of the T wave; *B* (case 41, position 3), variation in the site and the degree of notching of the QRS complex; *C* (case 60, position 4 and 5), variation in the configuration of the QRS and the T wave.

R wave at the end of inspiration. In some cases, when the R wave became smaller the Q wave became proportionately larger, and vice versa (fig. 4 *C*). When notching of the QRS complex was present, the site and the degree of the notching varied with each phase of respiration (fig. 4 *B*). The T wave showed similar variation in height; if upright, it frequently became taller as the QRS complex became smaller. It often changed direction with inspiration and expiration, becoming upright during the latter and inverted during the former (fig. 4 *A* and 4 *C*). These phasic variations in the precordial lead were not present in the standard leads and were probably the result of the movement of the diaphragm during respiration.

The Effect of the Position of the Body.—To determine the effect on the precordial lead of changes in the position of the body, records were taken of twenty-two children when they were recumbent, sitting

and standing. The Q and the R wave showed variations in height up to 5 or 6 mm. The direction of the change was not connstant, the deflections becoming either larger or smaller with the child upright. With the subject sitting or standing the T wave was usually of lower amplitude and became inverted sooner as the electrode moved from the sternum to the apex (positions 1 to 6), so that at times it was upright with the electrode in position 4 or 5 while the child was recumbent but inverted while he was sitting or standing. These changes emphasize the influence of the position of the heart on the precordial lead. It is probable that while one is sitting or standing the diaphragm descends and the heart becomes more nearly vertical.

COMMENT

With the standard leads of the electrocardiogram the differences between the tracings of children and those of adults are slight, but with the precordial lead the tracings of children are distinguished by the frequent occurrence of the upright T wave. Recently, Rosenbloom and Sampson [6] reported upright T waves in the tracings of 64 per cent of a group of fifty normal children ranging in age from 1 month to 16 years. The tracings of only two children showed inverted T waves. Unfortunately, these investigators placed the anterior electrode over the left second, third and fourth sternocostal junctions, a position not ordinarily used. With the electrode at this location the T wave may be upright even in normal adults. Indeed, the T wave was upright in the electrocardiograms of 20 per cent of their own control series of sixty-six normal adults, yet with the electrode in the positions generally used (positions 4 and 5 of our series) it is, with rare exceptions, inverted. Furthermore, Rosenbloom and Sampson made no mention of the Q or the R wave or of the presence of notching and slurring. Of further interest is the report of Heard, Burkley and Schaefer,[7] who obtained precordial leads for five fetuses aged from 9½ to 25 weeks. The T wave was upright in the electrocardiograms of four of the five.

The explanation of this difference between the direction of the T wave in the tracings of children and that in the tracings of adults appears to lie in the change which takes place with increasing age in the configuration of the heart and in the anatomic relationship of the ventricles. At birth the right ventricle predominates anatomically and

6. Rosenbloom, H., and Sampson, J. J.: A Study of Lead IV of the Electrocardiogram in Children with Especial Reference to the Direction of the Excursion of the T Wave, Am. Heart J. **11**:49, 1936.

7. Heard, J. D.; Burkley, G. G., and Schaefer, C. R.: Electrocardiograms Derived from Eleven Fetuses Through the Medium of Direct Leads, Am. Heart J. **11**:41, 1936.

functionally;[8] the interventricular septum deviates to the left. Frequently, preponderance of the right ventricle is indicated in the electrocardiogram.[9] As the child grows older the left ventricle becomes increasingly predominant, and the normal 2 to 1 ratio of the weight of the left ventricle to that of the right is attained at the age of 16 years. After 40, preponderance of the left ventricle is often normal. Another structural peculiarity of children is the greater anteroposterior diameter of the chest as compared with the transverse diameter.[8] At birth these diameters are equal; gradually the anteroposterior diameter becomes relatively smaller, until at the age of 15 the adult ratio of 4 to 5 is reached.

Deviation of the Axis or Preponderance of One Ventricle.—An attempt was made to correlate the direction of the T wave in the pre-

TABLE 3.—*The Influence of Deviation of the Axis on the Direction of the T Wave*

Preponderance	Cases	Upright or Diphasic T Waves	
		Position 4, Percentage of Cases	Position 5, Percentage of Cases
Right ventricle	3		
Tendency, right ventricle	9		
	12	66	33
Left ventricle	4		
Tendency, left ventricle	9		
	13	46	15
No preponderance	46	60	30
Total	71	60	30

cordial lead with the direction of the electrical axis in the standard leads (table 3). In twelve cases in which the average age was 9½ years, there was a tendency to preponderance of the right ventricle. An upright or diphasic T wave was present in 66 per cent of these cases when position 4 was used and in 33 per cent when position 5 was used. In thirteen cases, in which the average age was 9 years, there was a tendency to preponderance of the left ventricle, and an upright T wave was found in 46 per cent of these cases when position 4 was used and in only 15 per cent when position 5 was used. In the remaining cases, in which there was no deviation of the axis, the incidence of an upright

8. Gundobin, A. P.: Die Besonderheiten des Kindesalters, Berlin, Allg. med. Verlagsanstalt, 1912.

9. Burnett, C. T., and Taylor, E. L.: Electrocardiograms on One Hundred and Sixty-Seven Average Healthy Infants and Children, Am. Heart J. **11**:185, 1936.

T wave was 60 or 30 per cent, according to the position of the electrode, practically the same as in the cases in which there was deviation of the axis to the right. Hence, no definite relationship between deviation of the axis and direction of the T wave can be inferred from these figures, although the frequency of the T wave is somewhat less when preponderance of the left ventricle is present.

Configuration of the Heart.—The configuration of the heart as demonstrated by teleoroentgenograms varied considerably. In a large number of children there was straightening of the left border like that seen in disease of the mitral valve (figs. 2 and 3). In others, the right cardiac border extended farther to the right of the sternum than it does in adults. Both these deviations, of course, are normal in children. In the electrocardiograms of the children in whom the right ventricle predominated, the frequency of an upright T wave was no greater than it was in the electrocardiograms of the children with the adult type of heart. Similarly, there was no relation between the direction of the T wave and a long, narrow chest with a vertically placed heart or a wide chest with a transversely placed heart. Careful fluoroscopic examination was made of ten children, but no peculiarity was noted in those whose tracings showed upright T waves. We can therefore offer no explanation for the upright T waves based on teleoroentgenographic or fluoroscopic examination. However, it is significant that the upright T wave becomes less frequent as a child grows older and occurs only rarely after the age of 16, at which age the adult anatomic relationships in the heart have developed. Furthermore, it is at this age that the adult ratio of the transverse diameter to the anteroposterior diameter of the chest is reached.

The occurrence of both upright and inverted T waves in the precordial leads of children lessens its significance in the electrocardiograms of subjects under 16 years. Furthermore, because the T wave varies markedly with a slight change in the position of the chest electrode and with respiration, care must be used in evaluating changes even in serial records. Only when these variations are taken into account can importance be attached to this lead in the electrocardiograms of children.

SUMMARY

The findings by use of the precordial lead for seventy-one normal children aged from 2 to 15 are reported.

The precordial lead was studied with the electrode in seven positions on the anterior wall of the chest, beginning at the right sternal border and extending at intervals of 2 cm. to the left of the apex in the fourth or fifth interspace.

The P wave was usually 1 mm. or less in height and was inverted or upright. It was frequently absent when the electrode was near the apex.

The average duration of the PQ interval was from 0.10 to 0.14 second.

A Q wave was always present. Its height varied between 2 and 22 mm., depending on the position of the electrode, and was largest when the electrode was near the apex.

The R wave varied between 2 and 27 mm. in height, being smallest when the electrode was near the apex.

An initial upward deflection of from 0.5 to 2 mm. was frequently present with the electrode at the apex.

The QRS complex measured from 0.06 to 0.08 second in duration. Notching and slurring of this complex were not infrequent, regardless of what position was used.

The RT transition was commonly depressed or elevated 1 mm.

An upright or diphasic T wave with the electrode within the apex was common, occurring in 60 per cent of the cases. The incidence of upright T waves was much more common in the electrocardiograms of the younger children; in the electrocardiograms of children 14 or 15 years old the precordial lead approached the adult type. Therefore, it may be concluded that the chest lead in which the T wave is upright is characteristic of children.

Notable changes in the Q, R and T waves occurred with respiration and change in the position of the body.

No correlation was found between the presence of an upright T wave and either deviation of the axis (the preponderance of one ventricle) or the shape of the heart in a teleoroentgenogram.

The fact that the occurrence of an upright or an inverted T wave is normal deprives the chest lead of definite diagnostic value in the examination of children, and care must be taken in evaluating changes even in serial records. The value of serial records is now being investigated.

FUNCTIONAL HYPOGLYCEMIA OF CHILDHOOD

WITH PARTICULAR REFERENCE TO RECURRENT CONVULSIVE MANIFESTATIONS

JOHN MOTT RECTOR, M.D.
SAN FRANCISCO
AND
ROBERT E. JENNINGS, M.D.
EAST ORANGE, N. J.

Since the genesis of simple methods for the determination of glycemia, there have been numerous publications regarding the conditions in which hypoglycemia obtains. Most of these have been concerned with the hypoglycemia of adults, and recently special attention has been directed toward so-called hyperinsulinism.

Moderate glycometabolic defects, of an intensity sufficient to induce "silent" hypoglycemia, are not uncommon during infancy and childhood. We have reviewed the blood sugar values for five hundred and seventy-two patients under 12 years of age admitted to this clinic and have found that forty-three, or 7.5 per cent, presented hypoglycemic levels ranging from 50 to 69 mg. per hundred cubic centimeters. These children were hospitalized because of apparently unrelated disorders and presented no hypoglycemic manifestations.

In contradistinction, hypoglycemia associated with convulsions is undoubtedly more rare, yet eleven patients with this type of disorder were observed in the Infants' and Children's Hospitals from 1930 to 1934 (table 1). The majority were recognized during 1933, subsequent to the introduction of determinations of the sugar content of the blood as a routine in all cases of convulsions of obscure etiology. In nine cases recurrent hypoglycemia was the only finding of significance. One infant later showed demonstrable cortical atrophy following birth injury. This glycopenia may have been secondary to the cerebral lesion, as recently suggested by Darrow.[1] Another child in the series had accompanying streptococcic pneumonitis and cerebral edema.

The association of convulsions and hypoglycemia was first pointed out by Josephs [2] in 1924. At present in the literature there are reports

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1. Darrow, D. C.: Mental Deterioration Associated with Convulsions and Hypoglycemia: Report of Two Cases, Am. J. Dis. Child. **51**:575 (March) 1936.

2. Ross, S. G., and Josephs, H. W.: Observations on the Metabolism of Recurrent Vomiting, Am. J. Dis. Child. **28**:447 (Oct.) 1924.

of thirty-five cases of convulsions in children in which hypoglycemia was presumably the etiologic factor of primary importance.[3] It is worthy of connotation that in this group the glycopenia which prevailed was apparently functional or spontaneous in thirty-two cases. Only three patients showed organic lesions, two offering examples of absolute hyperinsulinism resulting from multiple pancreatic adenomas and hyperplasia of the islet cells, respectively,[3f,g] and the third offering an example of hepatic insufficiency incident to profound fatty degeneration.[3h]

INCIDENCE

Spontaneous hypoglycemia of recurrent type associated with convulsions may have its onset at any period throughout infancy and childhood, although the majority of cases occur in patients in the age group of from 1 to 3 years (chart). It is relatively infrequent in children less than 1 year old, and it is not common for the initial attack to appear in a child over 3 years old.

Although our series is too small to render the data for sex of any great importance, attention is called to the fact that eight of the eleven cases occurred in boys. An analysis of the cases described in the literature also shows a preponderance of boys over girls, the ratio being essentially 2 : 1.

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3. (*a*) Josephs, H.: Fasting as a Cause of Convulsions, Am. J. Dis. Child. **31**:169 (Feb.) 1926. (*b*) Griffith, J. P. C.: Hypoglycemia and the Convulsions of Early Life, J. A. M. A. **93**:1526 (Nov. 16) 1929. Baumhauer, J. H.: Hypoglycemia as a Cause of Convulsions in Children, J. M. A. Alabama **1**:312 (Feb.) 1932. Elias, H. L., and Turner, R.: Spontaneous Hypoglycemic Shock in Children, J. A. M. A. **98**:2198 (June 18) 1932. Graham, E. A., and Womach, N. A.: Application of Surgery to the Hypoglycemic State Due to Islet Tumors of the Pancreas, Surg., Gynec. & Obst. **56**:728 (April) 1933. (*c*) Fanconi, G.: Ueber azetonämische Krämpfe im Kindesalter. Bedeutung der Hypoglykämie, Jahrb. f. Kinderh. **142**:1, 1934. Boone, J. A.: Hyperinsulinism Without Demonstrable Pancreatic Changes in an Eleven Year Old Child, New England J. Med. **211**: 49 (July 12) 1934. Jaudon, J. C.: Hypoglycemia in Children: Report of a Case, Am. J. Dis. Child. **49**:1379 (May) 1935. (*d*) Barrow, S. C.: Hyperinsulinism: Three Cases Relieved by Radiation, Radiology **24**:320 (March) 1935. (*e*) Higgons, R. A.: Hypoglycemia in the New-Born, Am. J. Dis. Child. **50**:162 (July) 1935. (*f*) Wolf A.; Hare, C. C., and Riggs, H. W.: Neurological Manifestations in Two Patients with Spontaneous Hypoglycemia, Bull. Neurol. Inst. New York **3**:232 (June) 1933. (*g*) Dannenberg, A. M.; Bell, M. A., and Gouley, B.: Spontaneous Hypoglycemia Due to Hyperinsulinism in a Child, Am. J. Dis. Child. **49**:1371 (May) 1935; Spontaneous Hypoglycemia Due to Hyperinsulinism: Report of a Case with Autopsy Findings, J. Pediat. **7**:44 (July) 1935. (*h*) Kramer, B.; Grayzel, H. G., and Solomon, C. I.: Chronic Hypoglycemia in Childhood, ibid. **5**:299 (Sept.) 1934.

ETIOLOGY

In general, a consideration of the hypoglycemic state shows that there is need for classifying these cases more specifically than has been done in the past. One may readily visualize the possibility of a number of pertinent etiologic factors; the following classification embodies some of the more important mechanisms concerned:

Classification

I. Endocrine hypoglycemia
   - A. Pancreas
     1. Hyperinsulinism (absolute)
        - (*a*) Islet cell tumors
        - (*b*) Hypertrophy or hyperplasia of islets
        - (*c*) (?) Increased vagal activity
     2. Hypotrypsinism (relative hyperinsulinism)
        - (*a*) Acinar degeneration
        - (*b*) Pancreatic hypoplasia
   - B. Adrenal body
   - C. Thyroid gland
   - D. Pituitary gland

II. Hepatic hypoglycemia
   - A. Organic
     1. Acute intoxications (poisons, toxins, etc.)
     2. Chronic disturbances (cirrhosis, von Gierke's disease, etc.)
   - B. Functional
     1. Caloric lack (anorexia, starvation, vomiting, etc.)
     2. Excess demand (excitement, fever, overexertion, anesthesia)

Any of these factors are perhaps theoretically capable of producing hypoglycemic convulsions in children, although in the present group it seems possible to exclude most of them with fair accuracy. Tumor of the pancreas with hyperinsulinism runs a progressive course, with practically no tendency toward spontaneous improvement or recovery.[4]

4. Harris, S.: Hyperinsulinism and Dysinsulinism, Endocrinology **16**:29 (Jan.-Feb.) 1932. Wilder, R. M., and others: Cancer of the Islands of the Pancreas, J. A. M. A. **89**:348 (July 30) 1927. Thalhimer, W., and Murphy, F. D.: Carcinoma of the Pancreas, Hyperinsulinism, and Hypoglycemia, ibid. **91**:89 (July 14) 1928. McClenahan, W. V., and Norris, G. W.: Adenoma of the Islands of Langerhans with Associated Hypoglycemia, Am. J. M. Sc. **177**: 93 (Jan.) 1929. Howland, G., and others: Dysinsulinism, J. A. M. A. **96**:674 (Aug. 31) 1929. Carr, A. D., and others: Hyperinsulinism from B-Cell Adenoma of Pancreas, ibid. **96**:1363 (April 25) 1931. Rabinovitch, J., and Barden, F. W.: Hypoglycemia Associated with a Tumor of the Islands of Langerhans and with Adrenal Insufficiency, Respectively, Am. J. M. Sc. **184**:494 (Oct.) 1932. Bast, T. H.; Schmidt, E. R., and Sevringhaus, E. L.: Pancreatic Tumor with Hypoglycemic Status Epilepticus, Acta chir. Scandinav. **71**:82, 1932. Derick, C. L., and others: Spontaneous Hyperinsulinism, New England J. Med. **208**:293 (Feb. 9) 1933. Warren, Shields: Adenoma of the Islands of Langerhans, Am. J. Path. **2**:335, 1926.

Only one case in a child has been reported,[3f] and the extreme rarity in children under 12 years of age is well attested by the fact that in fifteen hundred consecutive autopsies performed at this clinic there was no gross or microscopic evidence of pancreatic neoplasm.[5] Likewise, hypertrophy and hyperplasia of the islet cells are rare, only one case having been recorded in a child, with the exception of those occasional instances of compensatory hypertrophy in a hypoglycemic infant born of a diabetic mother.[6] Hyperinsulinism as a result of increased vagal activity has been demonstrated experimentally but not clinically.[7] Therapeutic tests with atropine in cases of hypoglycemia of suspected vagotonic type have failed to substantiate this diagnosis.[8] Hypotrypsinism is an infrequent condition, and the only case of glycopenia reported that definitely falls into this category is one described by Winans, in which there was extreme hypoplasia of the pancreas, with degeneration of the acinar tissue.[9] Examination of the stool in our cases failed to show any indication of digestive impairment suggestive of a deficiency of trypsin. Gross evidence of hypo-adrenalism, such as adynamia, apathy or hypotension, was notably lacking, and there was nothing indicative of thyropituitary dyscrasia or hepatic disease.

Functional hypoglycemia appears to be a more feasible explanation of these cases among juvenile patients. It has been established that fasting in children causes a rapid and profound exhaustion of the glycogen reserve. The immature organism is unable to create a degree of compensation by glycogenesis to maintain normal glycemia.[10] Rumpf demonstrated that the carbohydrate reserve of newly born infants is exhausted in twenty-four hours, and he suggested that the ease with which this phenomenon occurs is directly proportional to the age of the infant.[11] Josephs [3a] has demonstrated that children subject to gly-

5. Farber, S.: Personal communication to the authors.

6. Gray, S. H., and Feemster, L. C.: Compensatory Hypertrophy and Hyperplasia of the Islands of Langerhans in the Pancreas of a Diabetic Mother, Arch. Path. **1**:348 (March) 1926. Dubreuil, G., and Anderodias, G.: Ilots de Langerhans géants chez un nouveau-né, issue de mère glycosurique, Compt. rend. Soc. de biol. **83**:1490, 1920. Higgons.[3e] Dannenberg, Bell and Gouley.[3g]

7. Britton, S. W.: Studies on the Conditions of Activity in Endocrine Glands, Am. J. Physiol. **74**:291 (Oct.) 1925.

8. Ramsbottom, A., and Eastwood, C. G.: Spontaneous Hypoglycemia, Brit. M. J. **1**:833, 1932.

9. Winans, H. M.: Hypoglycemic Convulsions with Hypoplasia of the Pancreas, Am. J. M. Sc. **185**:500 (April) 1933.

10. Shaw, E. B., and Moriarty, S. B.: Hypoglycemia and Acidosis in Fasting Children with Idiopathic Epilepsy, Am. J. Dis. Child. **28**:553 (Nov.) 1924. Josephs, H.: Post-Anesthetic Hypoglycemia, Bull. Johns Hopkins Hosp. **37**:376 (Dec.) 1925.

11. Rumpf, F.: Ueber der Blutsucker im Hunger, Jahrb. f. Kinderh. **105**: 317, 1924.

copenia show a greater fall in the level of the blood sugar after fasting than do normal children. It is not difficult to see how agents that increase the metabolism, such as overexertion or fever, might readily lead to a depletion of the carbohydrate reserve. This would, of course, be enhanced in the presence of an inadequate caloric intake induced

TABLE 1.—*Analysis*

Patient	1	2	3	4	5
Age	6 years	5 years	27 months	2½ years	30 months
Sex	Male	Male	Female	Male	Male
Age at onset	3 years	3½ years	27 months	1 year	20 months
Duration of illness	3 years	1½ years	5 days	1½ years	10 months
Time of attacks	Late afternoon or night	Early a. m.	Late afternoon	Early a. m.	Irregular
Causative factors	Fasting	Fever; fasting	Fasting	Fever; over-activity	Acute infection; starvation
Symptoms	Weakness; vomiting; coma; convulsions; drowsiness	Abdominal pain; vomiting; fainting spells; coma; convulsions	Anorexia; vomiting; abdominal pain; drowsiness; convulsions	Polyphagia; excitement; irritability; vomiting; convulsions; coma	Weakness; drowsiness; convulsions
Clinical findings	No fever; dental caries; moist skin; convulsions	Pharyngitis; purulent post-nasal drip; fever; convulsions	Moderate obesity; convulsions	Acute pharyngitis; fever; dehydration; acetone breath; convulsions	Acute pharyngitis; fever; acetone breath; convulsions
Laboratory data					
Blood sugar, mg. per 100 cc.	42	40	57	29	..
Spinal fluid sugar, mg. per 100 cc.	..	20	..	21	20
Miscellaneous data	..	..	..	Carbon dioxide 33 vol. %	..
Urine	Acetone	Acetone	Acetone	Acetone	Acetone
Comment	Immediate response to intravenous injection of dextrose; no further attacks on diet high in carbohydrate	Convulsion instantly checked with intravenous injection of dextrose; subsequent seizures prevented by diet high in carbohydrate	Convulsions ceased rapidly after oral ingestion of dextrose; blood sugar value at time of discharge 78 mg. per 100 cc.	Prompt response to intravenous injection of dextrose; attacks reduced by diet high in carbohydrate and subsequently prevented entirely by ketogenic diet	Sedatives ineffective; convulsions checked by intravenous injection of dextrose; diet high in carbohydrate on discharge; no symptoms since then

* Blood sugar determinations were made on capillary blood according to the microtechnic of the for children of this age group during fasting, although variations from 70 to 99 mg. were considered within Dextrose tolerance was ascertained by the oral method, and a uniform dose of 1.75 Gm. per kilogram of

by anorexia, vomiting or a short fast. An analysis of the response to epinephrine in our series (table 2), even at a time when the children were asymptomatic, suggests a partial, but not complete, lack of glycogen stores.

SYMPTOMATOLOGY

The list of symptoms referable to hypoglycemia is long and, with a few exceptions, is somewhat analogous to that observed following an overdose of insulin (table 1). All degrees of severity are seen.

There is no absolute blood sugar level at which glycopenic manifestations occur. The level shows great individual variation and fluctuates for the same patient from day to day. The "habitual" level of the blood sugar is of great importance, and the final development of symptoms depends largely on the rapidity with which the new low level

of Cases *

6	7	8	9	10	11
3 years	3 days	10½ years	5 years	3 years	10 years
Female	Male	Female	Male	Male	Male
3 years	48 hours	8½ years	5 years	3 years	18 months
3 hours	12 hours	2 years	24 hours	12 hours	6½ years
Early a. m.	.....	5 a. m. or 9:30 p. m.	5 p. m.	7 a. m.	Late afternoon or evening
Acute infection; starvation	Starvation	Fasting	Fasting	Refusal	Infection; excitement
Drowsiness; convulsions; coma	Refusal of food; inactivity; stupor	Pallor; sweating; apprehension; restlessness; tremor; convulsions	Irritability; hyperhidrosis; coma; convulsions	Cough; convulsions	Polyphagia; hiccup; abdominal pain; vomiting; convulsions; coma
Acute sinusitis; acetone breath; dehydration; absence of deep reflexes; coma	Acetone breath; spasticity; hyperactivity of deep reflexes; coma; convulsions	Intelligence quotient 100% plus; normal encephalogram; no clinical abnormality	No abnormality	Labored respirations; cyanosis; fine râles	Moderate malnutrition; acetone breath; lordosis
..	86	64	66	37	"Low"
22	17	..	..	..	..
..	..	..	..	..	Basal metabolism plus 12%
Acetone	Acetone	Normal	Acetone	..	Acetone
Coma promptly relieved by oral ingestion of dextrose; three days later sugar in spinal fluid 70 mg. per 100 cc.; no further attacks	Immediate response to intravenous injection of dextrose; mental retardation apparent at 4 mo.; cortical atrophy shown by encephalogram	Symptoms relieved by epinephrine; attacks ceased with onset of menstruation	Prompt relief from solution of dextrose orally	Convulsions checked temporarily by intravenous injection of dextrose; necropsy showed streptococcic pneumonitis; pancreas normal	Attacks readily aborted with diet high in carbohydrate; no symptoms for past 2 years

Folin-Wu method. A figure of from 80 to 88 mg. was arbitrarily selected as an average normal figure normal limits. Determinations of less than 70 mg. per hundred cubic centimeters were termed hypoglycemic. body weight was maintained throughout.

is reached.[12] The eighth patient showed definite prodromal symptoms, which were relieved immediately by epinephrine, when the level of the blood sugar (during fasting) dropped from 100 to 79 mg. per hundred cubic centimeters.

12. MacLeod, J. J. R.: Carbohydrate Metabolism and Insulin, London, Longmans, Green & Co., 1926, p. 196.

DIAGNOSIS

These patients presented no common denominator indicative of a "hypoglycemic type" of disorder. A diagnosis of convulsions associated with hypoglycemia may be suspected in a child when the attack occurs late at night, in the early morning or several hours postprandially, with a preceding history of anorexia, vomiting, pyrexia, excessive muscular effort or excitement. A diminution of the sugar content of an otherwise normal spinal fluid is a highly suggestive finding and of great diagnostic value. Such hypoglycorrhachia served as a diagnostic lead in several of our cases.

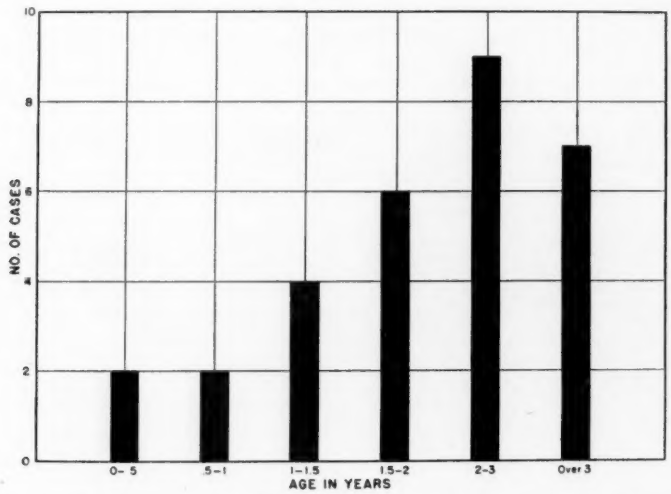

Chart showing the age incidence for thirty patients with hypoglycemia in association with convulsions.

TABLE 2.—*Dextrose Tolerance Curve and Response to Epinephrine* *

Case	1		2		3	4		5		8		11
Fasting	89	83	88	77	78	59	84	111	95	100	89	95
½ hour	167	106	143	96	105	108	89	140	125	200	127	169
1 hour	260	109	120	116	113	77	106	127	123	200	105	113
1½ hours	...	89	123	...	...	...	110	125	108	...	105	...
2 hours	...	86	...	71	91	83	83	122	97	148	116	81
2½ hours	140	...	118	...	...	...	...	...	...	...	...	...
3 hours	67	69	...	...	80	69	78	108	82	111	92	78
4 hours	...	...	75	64	...	...	80	...	...	...	79	...
10 minutes after epinephrine	...	81	...	90	...	100	92	...	130	...	79	...
30 minutes after epinephrine	...	97	...	100	...	114	104	...	123	...	95	...
60 minutes after epinephrine	...	...	...	...	...	116	...	...	...	...	...	...
120 minutes after epinephrine	...	...	...	...	...	95	...	...	...	...	...	...

* The values are given in milligrams per hundred cubic centimeters.

The final diagnosis rests on the finding of a convulsive or postconvulsive level of the blood sugar of less than 70 mg. per hundred cubic centimeters, coupled with a therapeutic response to dextrose. Spon-

taneous hypoglycemia of this type is intermittent, and between attacks there is an essentially normal level of the sugar.

Dextrose tolerance tests contribute little, although there is perhaps a slight tendency toward an increased tolerance to carbohydrate in these patients. A combined analysis of the curves in this series, together with those reported in the literature, reveals an average maximal rise of 48 mg. per hundred cubic centimeters after the oral ingestion of dextrose [13] (table 2). There is a tendency also toward the approach to an exaggerated hypoglycemic level at the end of three or four hours. As previously mentioned, the response to epinephrine likewise is somewhat less than is usually seen, the average maximal rise in our series being 33 mg. per hundred cubic centimeters. There was no correlation between the dextrose tolerance and the response to epinephrine in any case.

TREATMENT

The convulsions of spontaneous hypoglycemia are best treated with intravenous injections of dextrose solution, although many children show a prompt response to the injection of epinephrine given in conjunction with sweetened fluids by mouth. Hypnotics are of no apparent value, and their use is not advisable.

Prophylactic therapy should be largely dietary. Attacks are prevented in most instances by a diet moderately high in carbohydrate, augmented by a midmorning, midafternoon and after-supper feeding. Particular attention to the intake of carbohydrate at the onset of an acute infection is essential, as an attack is especially likely to occur at such a time. Should the necessity for any operative procedure arise in a hypoglycemic patient, it is imperative that the preoperative care embrace the liberal use of dextrose.

In occasional cases a high intake of carbohydrate apparently stimulates the islet cells and produces an oversecretion of insulin. Should a carbohydrate regimen prove ineffective or cause an aggravation of the attacks, considerable clinical evidence has accrued to show that a mild ketogenic diet, of a 1:1 or 2:1 ratio, is worthy of trial.[14] A dietary of this type seems rational, as it creates a moderate depression of the carbohydrate tolerance, with increased and protracted hypergly-

13. The average "normal" rise for children of this age is approximately 67 mg. per hundred cubic centimeters.

14. Walters, W. C.: Spontaneous Hypoglycemia: The Rôle of Diet in Etiology and Treatment, South. M. J. **24**:249, 1931. Kohn, J. L.; Fries, M. E., and Felshin, G.: Spontaneous and Induced Ketosis in Children, Am. J. Dis. Child. **34**:857 (Nov.) 1927. Thompson, G.; Mitchell, D. M., and Kolb, L. C.: The Influence of Variations in Systemic Acid-Base Balance upon Carbohydrate Tolerance in Normal Subjects, Biochem. J. **27**:1253, 1933.

cemia. After our fourth patient had responded only partially to a diet high in carbohydrate, complete relief was afforded by a ketogenic regimen.

The use of extracts of the pituitary, thyroid and adrenal glands as a prophylactic measure for adults has been advocated by several investigators, but the results in general have been unsatisfactory.[15] Their use for children does not seem indicated.

In patients refractory to diet, roentgen irradiation has been suggested. Barrow [3d] treated three patients with this type of disorder with repeated small doses of roentgen rays over the abdomen and stated that he found the therapy curative. Before acceptance, further investigation of this procedure is desirable, as the rationale is questionable.

The possibility of pancreatic neoplasm, even though remote, should be kept in mind. If the course is progressive and unaccompanied with demonstrable dietary benefit, exploratory laparotomy is to be considered. In cases of suspected hyperinsulinism without evidence of tumor, subtotal pancreatectomy has been performed, with no clinical improvement in most cases.[16] More conservative measures are to be recommended.

PROGNOSIS

As only a decade has elapsed since Josephs first called attention to this disorder and because of the small number of cases reported, the ultimate outcome in these cases is not known. While the onset in several adults was during adolescence, none of the disorders actually began in early childhood, and there was no apparent relationship between the two. The eleventh patient, now 10 years old, first showed evidence of spontaneous improvement at the age of 6, and for the past two years has been asymptomatic without treatment. The eighth patient, who had her initial convulsion at 8 years of age, recovered completely with the advent of puberty.

Among adults there is some evidence which suggests that hypoglycemia of moderate severity is capable of producing a certain degree of myocardial injury.[17] This finding has not been observed in children. It has also been demonstrated on animals that induced glycopenia with convulsions may cause anatomic changes in the brain, followed by per-

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15. McGovern, B. E.: Epileptoid Attacks and Hyperinsulinism, Endocrinology **16**:293 (May-June) 1932. Heyn, L. G.: Hyperinsulinism, J. A. M. A. **98**:1441 (April 23) 1932. Hartman, F. L.: Hypoglycemia, M. Clin. North America **12**: 1035, 1929.

16. Holman, E., and Railsback, O. C.: Partial Pancreatectomy in Chronic Spontaneous Hypoglycemia, Surg., Gynec. & Obst. **51**:591, 1933.

17. Sippe, C.: Hypoglycemic Angina, M. J. Australia **2**:302 (Sept 2) 1933. Shanks, E. D., and Allen, E. W.: Hypoglycemia, J. M. A. Georgia **21**:229 (June) 1932.

manent degeneration of the central nervous system.[18] While our seventh patient had demonstrable cortical atrophy, it was probably secondary to intracranial hemorrhage sustained at birth. Our patients, otherwise, presented no neuropathologic sequelae.

CONCLUSIONS

Confusion in the literature, arising from erroneous diagnosis and lack of uniform terminology, indicates a need for the adoption of a more specific classification of the hypoglycemic state.

A study of eleven cases of hypoglycemia associated with recurrent convulsions, together with a review of the reports previously contributed, suggests that among infants and children hypoglycemia is usually a functional hepatic disorder of intermittent character, resulting from a temporary depletion of the glycogen reserve. In most cases the condition is amenable to conservative management, and the prognosis is infinitely better than it is for older patients with hypoglycemia, which is often organic.

While hypoglycemia is undoubtedly not a frequent cause of convulsions in childhood, continued emphasis on the desirability of making studies of the blood sugar in all cases of obscure convulsive disorders may demonstrate a current incidence greater than is now accepted.

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18. Grayzel, D. M.: Changes in the Central Nervous System Resulting from Convulsions Due to Hyperinsulinism, Arch. Int. Med. **54**:695 (Oct.) 1934.

IMMUNOLOGIC AND BACTERIOLOGIC FEATURES OF PNEUMOCOCCIC INFECTIONS IN NEPHROSIS

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The frequent occurrence of pneumococcic peritonitis as a terminal infection in nephrosis and the contention of Blackman and others [1] that nephrosis is a result of pneumococcic infection suggested a study of children with nephrosis from the standpoint of their humoral immunity against the pneumococcus. The fact that pneumococcic peritonitis is the common cause of death in nephrosis stimulated also an investigation into the value of systemic and local immunization in the prevention of this terminal pneumococcic peritonitis. As a supplementary study, cultures of material from the nose and throat and in the case of girls of material from the vagina also were made to establish if possible the source of the penumococcic invasion.

Secondary pneumococcic infections have long been known to be a complicating factor in nephrosis. Volhard and Fahr,[2] in 1914, were the first to call attention to the close relationship existing between these two conditions, and they included in their report a description of three cases of nephrosis terminating in pneumococcic peritonitis. With the increasing accumulation of case reports in the literature, a diversity of opinion has been expressed regarding the rôle of the pneumococcus as the etiologic agent in nephrosis. Some investigators hold that this organism is responsible for the initial renal disease as well as for the subsequent terminal peritonitis,[1] but perhaps more prevalent is the view that the pneumococcus is only a secondary terminal invader.

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† Dr. Peacock died on Jan. 3, 1936. The work reported on in this article was not then completed; it was finished by Miss Werner with the advice and assistance of Drs. O. H. Robertson and W. D. Sutliff.

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1. Blackman, S. S., Jr.: Bull. Johns Hopkins Hosp. **45**:1-56, 1934. Volhard, F., in von Bergmann, G., and Staehelin, R.: Handbuch der inneren Medizin, Berlin, Julius Springer, 1931, vol. 6, pt. 2, p. 1056. Govaerts, P., and Cordier, R.: Bull. Acad. roy. de méd. de Belgique **8**:510-548, 1928.

2. Volhard, Franz, and Fahr, Theodore: Die Brightsche Nierenkrankheit: Klinik, Pathologie und Atlas, Berlin, Julius Springer, 1914.

I. PNEUMOCOCCIDAL AND MOUSE PROTECTION TITERS OF NEPHROTIC AND NORMAL CHILDREN

Methods.—Chosen as the methods best adapted for determining the titer of antipneumococcic immunity were the whole blood pneumococcidal and the mouse protection test. The technic of the pneumococcidal test was essentially that employed by Sutliff and Finland.[3] The pneumococci used in the tests were strains of types I and II and occasionally of other types isolated from the peritoneal fluid and from cultures of material from the throats of the nephrotic patients. All strains used were of such virulence that mice which received an injection of 0.5 cc. of a 1:10,000,000 (10^{-7}) dilution of the organisms died in from twenty-four to forty-eight hours. The organisms were grown for sixteen or eighteen hours in rabbit serum-dextrose broth. One-tenth cubic centimeter quantities of dilutions ranging from 1:10 (10^{-1}) to 1:10,000,000 (10^{-7}) were made in gelatin and Locke's solution. Each dilution was placed with 0.5 cc. of whole defibrinated blood in a small glass tube. The tubes were sealed with a flame, placed on an agitating machine of the type described by Robertson and his co-workers[4] and incubated while rotating at 37 C. for seventy-two hours. At the end of each day the color change in the tubes was noted. At the end of the incubation period the tubes were opened, and the growth as indicated by the color change was confirmed by streaking a loopful of the mixture on blood agar plates. Controls included in each test consisted of the 1:1,000,000 (10^{-6}) and the 1:10,000,000 (10^{-7}) dilution, with two-thirds part serum and one-third part gelatin and Locke's solution substituted for the whole defibrinated blood.

The mouse protection test was that originated by Neufeld[5] and modified by Avery[6] and his co-workers. The pneumococci were of the same strains as those used in the pneumococcidal tests. Five-tenths cubic centimeter quantities of dilutions ranging from 1:10 (10^{-1}) to 1:10,000,000 (10^{-7}) were injected, simultaneously with 0.2 cc. of serum, intraperitoneally into mice. Five-tenths cubic centimeter of the 1:10,000,000 (10^{-7}) dilution alone constituted the control.

Pneumococcic cultures of blood from the atria were made in rabbit serum-dextrose broth. The cultures were incubated from four to six hours and were injected intraperitoneally into mice.

Cases Selected for Study.—The children included in this study ranged in age from 2 to 13 years. In fourteen cases the diagnosis was nephrosis; in one, pyohydronephrosis, and in three, another type of nephritis. Fifteen control children were chosen from among those who gave no history of recent infection. The diagnoses on admission were fracture, hernia, chorea, etc. In addition, there were two cases of lobar pneumonia. Pneumococcidal and mouse protection titers were determined for from one to five samples of blood from each child with nephrosis or another type of nephritis. At the time of these determinations, identical tests were made on a sample of blood obtained from a child in the control group.

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3. Sutliff, W. D., and Finland, Maxwell: J. Exper. Med. **55**:837-852, 1932.

4. Robertson, O. H.; Woo, S. T., and Cheer, S. N.: J. Exper. Med. **40**: 487-491, 1924.

5. Neufeld, F., and Handel, L.: Ztschr. f. Immunitätsforsch. u. exper. Therap. **3**:159, 1909.

6. Avery, O. T.; Chickering, H. T.; Cole, R., and Dochez, A. R.: Acute Lobar Pneumonia, Monograph 7, Rockefeller Institute for Medical Research, 1917, p. 56.

Findings.—There was no noteworthy difference between either the pneumococcidal or the mouse protection titers of the children with nephrosis and those of the normal children. For both groups the titers varied within wide limits; some children possessed high humoral immunity, while others lacked this property entirely (tables 1, 2 and 3).

There was but slight difference in the pneumococcidal action of the blood against types I and II, that against type II being generally somewhat greater. This finding is similar to that of Sutliff and Finland.[8] There was no marked difference between the pneumococcidal power of the blood against the fixed types and its efficacy against the types of group IV which were tested. The presence of pneumococci in the throat did not affect the pneumococcidal action of the blood when it was

TABLE 1.—*Antipneumococcic Immunity Titers of Normal Children*

Case No.	Date of Tests	Pneumococcidal Tests*		Mouse Protection*	
		Type I	Type II	Type I	Type II
1	10/ 1	10^{-5}	10^{-4}	0†	0
2	10/11	10^{-3}	10^{-3}	10^{-6}	10^{-7}
3	10/15	10^{-4}	10^{-4}	0	0
4	10/17	10^{-3}	10^{-3}	10^{-6}	10^{-6}
5	11/ 6	10^{-3}	10^{-3}	10^{-7}	10^{-7}
6	3/12	10^{-3}	10^{-3}	10^{-7}†	10^{-7}†
7	3/19	10^{-3}	10^{-3}	0	0
8	4/ 3	10^{-4}	10^{-4}	—‡	—
9	6/ 4	10^{-3}	—	10^{-3}	—
10	6/ 7	10^{-5}	—	10^{-6}	—
11	6/12	10^{-6}	—	0	—
12	6/21	0	10^{-4}	0	0
13	6/28	0	10^{-5}	0	10^{-6}
14	11/13	10^{-3}	10^{-4}	10^{-3}	10^{-6}
15	4/26	0	10^{-4}	—	—

* The figures in all tables under "Pneumococcidal Tests" represent the lowest dilutions of pneumococcus suspension (standardized to contain approximately 500,000,000 organisms per cubic centimeter) in which the organisms were killed by 0.5 cc. of whole blood and under "Mouse Protection" the lowest dilution against which 0.2 cc. of serum protected.

† 0 = no immunity.

‡ — = no test.

tested against the homologous strain. There was little if any constancy in the pneumococcidal reactions in children on whom tests were repeated two or more times.

The mouse protection titers as a rule were somewhat lower than the corresponding pneumococcidal titers and showed the same difference in relation to types I and II.

Attempts were made to isolate pneumococci in twelve of the fourteen cases of nephrosis. Pneumococci were isolated from the peritoneal fluid in six cases. It is interesting that with the exception of one organism, of type II, all the strains were of group IV. Those of group IV were typed as follows: XV, XVI and XIX. Four of these six strains were tested for virulence in mice; one (group IV, untyped) was virulent in a dilution of 1:10,000,000 (10^{-7}), while strains of types XV, XVI and XIX were relatively avirulent, killing mice only in a dilution of 1:10 (10^{-1}).

Pneumococci were isolated in seven of nine cases of nephrosis in which a culture was made of material from the throat. The strains all belonged to group IV, types VI (in two cases), VII, XIII, XV, XIX

TABLE 2.—*Antipneumococcic Immunity Titers of Nephrotic Children*

Case No.	Date of Tests	Pneumococcidal Tests		Mouse Protection	
		Type I	Type II	Type I	Type II
1.....	10/ 4	0	10^{-4}	0	10^{-6}
2.....	10/ 9	0	10^{-4}	0	0
3.....	10/22	10^{-3}	10^{-3}	0	0
	11/16	10^{-3}	10^{-4}	0	10^{-5}
	4/30	10^{-5}	10^{-5}	—	—
	5/31	0	—	—	—
	6/ 4	0	—	0	—
4.....	12/14	10^{-4}	10^{-4}	10^{-5}	10^{-7}
5.....	1/29	10^{-5}	10^{-6}	—	—
	3/23	10^{-4}	10^{-4}	10^{-7}	10^{-5}
6.....	1/29	10^{-4}	10^{-4}	—	—
7.....	2/12	10^{-3}	10^{-3}	10^{-4}	0
	3/ 5	10^{-4}	10^{-5}	0	0
8.....	2/ 8	10^{-4}	10^{-6}	10^{-7}	10^{-7}
	3/ 5	10^{-4}	10^{-4}	10^{-5}	10^{-5}
9.....	2/ 8	10^{-3}	10^{-3}	10^{-7}	10^{-7}
10.....	2/26	10^{-4}	10^{-4}	10^{-5}	10^{-7}
	3/12	10^{-4}	10^{-3}	10^{-5}	10^{-5}
11.....	4/30	10^{-4}	10^{-3}	—	—
	5/31	0	—	—	—
	6/12	0	—	10^{-7}	10^{-4}
12.....	6/ 7	10^{-7}	—	0	—
	6/18	10^{-6}	10^{-4}	10^{-2}	0
	11/13	0	10^{-4}	0	0
13.....	2/15	10^{-4}	10^{-4}	0	0
	3/23	10^{-4}	10^{-4}	0	0
	6/28	10^{-7}	10^{-4}	0	—
14.....	4/26	0	10^{-3}	—	—

TABLE 3.—*Antipneumococcic Immunity Titers of Children with Other Types of Nephritis*

Case No.	Date of Tests	Pneumococcidal Tests		Mouse Protection	
		Type I	Type II	Type I	Type II
1.....	1/11	0	0	—	0
	2/ 5	10^{-4}	10^{-4}	0	0
2.....	2/15	10^{-6}	10^{-5}	0	0
3.....	2/22	0	0	0	0
	2/26	0	0	—	—
4.....	3/19	10^{-7}	10^{-4}	10^{-3}†	0

and XXXI, respectively. Unlike the strains isolated from the peritoneal fluid, five of the six strains were virulent for mice.

In three cases of nephrosis the pneumococci isolated from the peritoneal fluid and from the throat were of different types. In one of these cases pneumococci were isolated from the blood also. These organisms proved to be of the same type as those grown from the peritoneal fluid. The pneumococcus isolated from the peritoneal fluid

was one of those found to be virulent. A test for virulence was not performed with the organisms obtained from the blood.

Cultures of material from the throat were also made for two children of the four with another type of nephritis and for three of the eighteen control children. In this total of five cultures, pneumococci of group IV, types VII, XVII and XXIV, respectively, were isolated. The two cultures of group IV pneumococci were not typed.

Cultures of material from the vagina were made for four of the girls with nephrosis (without peritonitis) and for four of the control children. Pneumococci did not grow in any of the cultures.

II. IMMUNIZATION OF RABBITS WITH PNEUMOCOCCUS SPECIES-SPECIFIC ANTIGEN

The pneumococci isolated from the peritoneal fluid in our series of six cases in which penumococcic peritonitis developed with one exception did not belong to any of the fixed types of pneumococci but were members of the large heterogeneous group IV. For this reason hope of preventing terminal pneumococcic peritonitis in nephrosis by the production of type-specific antibodies was abandoned during the course of our investigations. The production of a common antipneumococcic species immunity offered a more promising approach to the problem. Successful immunization against virulent smooth strains of the fixed types of pneumococci by the use of species-specific antigen prepared from rough degraded strains of any one of types I, II or III has been reported by Tillett.[7] We therefore continued our experiments with rabbits for the purpose of producing, by means of a pneumococcus species-specific antigen, (1) systemic immunity and (2) local immunity and, by means of organisms other than pneumococci, (3) nonspecific immunity, in an attempt to protect the rabbits against intraperitoneal injections of lethal doses of type-specific pneumococci belonging both to the fixed types and to those of group IV.

Method.—The pneumococcus species-specific antigen was prepared according to the method of Tillett.[7] A rough strain of the type I pneumococcus was grown in plain broth from sixteen to eighteen hours. The culture was centrifugated and the organisms resuspended in physiologic solution of sodium chloride in such quantity that 0.5 cc. of the vaccine was equivalent to 1 cc. of the original culture. The organisms were killed by heating at 56 C. for thirty minutes. A fresh vaccine was prepared each day just before use and was tested for sterility.

Rabbits were immunized according to the method described by Cole and Moore.[8] Five-tenths cubic centimeter doses of the vaccine were given daily for six days, and a week of rest followed. The procedure was repeated three

7. Tillett, William S.: J. Exper. Med. **48**:791-804, 1928.

8. Cole, Rufus, and Moore, Henry F.: J. Exper. Med. **27**:537, 1917.

times. The vaccine was given subcutaneously to the group immunized systemically and intraperitoneally to the group immunized locally.

The infecting doses of the pneumococci were smooth, virulent strains of types II and XIX. The latter was chosen as a representative of group IV because the organism had been isolated in one of the cases of fatal peritonitis in our series. The strains were grown in 2 per cent rabbit blood broth, and the infecting dose was standardized to contain 1,000 lethal doses.

Bacillus coli was chosen as the organism to be employed in the preparation of the nonspecific antigen, on the basis of a report by Goldblatt and Steinberg.[9] These workers were able to immunize dogs against intraperitoneal injections of this organism. The vaccine was prepared according to their technic with the same strain of B. coli (300) as was used by them.

The organisms were grown twenty-four hours on plain agar slants, suspended in physiologic solution of sodium chloride and killed by heating one hour at 56 C. The dose of vaccine was modified according to the weight of the rabbit. It was approximately one-tenth that used by Goldblatt and Steinberg for dogs. The doses consisted of 1 cc. portions each of one, two, three and four agar slant cultures suspended in 10 cc. of physiologic solution of sodium chloride. Four doses of the vaccine were given intraperitoneally three days apart.

The infecting dose of B. coli consisted of 5 cc. of a 40 cc. suspension made from three agar slants in 2.5 per cent tragacanth in physiologic solution of sodium chloride. The inoculations were given intraperitoneally. The immunized rabbits showed no ill effects, while the nonimmunized rabbits succumbed to the infecting dose within twenty-four hours.

From eighteen days to six weeks after immunization the standard doses of types II and XIX were given intraperitoneally to the rabbits in each of the three groups. The animals which died were examined post mortem, and cultures were made of the peritoneum and of the blood.

Findings.—Three groups of ten rabbits each were used in this experiment. The rabbits in group 1 were immunized systemically by the subcutaneous route with the pneumococcus species-specific antigen; those in group 2 were immunized locally by the intraperitoneal route with the same antigen, and those in group 3 were immunized locally by the intraperitoneal route with the nonspecific antigen (B. coli).

From eighteen days to six weeks after the completion of the series of injections in groups 1, 2 and 3, one half of the rabbits were infected intraperitoneally with type II pneumococci and the other half with type XIX. One thousand lethal doses comprised the infecting dose with both organisms.

In group 1, two of the five rabbits survived the infecting dose of type XIX pneumococcus and one of the five rabbits the infecting dose of type II pneumococcus. The remaining seven rabbits died from twenty-four to forty-eight hours after the injection of the infecting dose.

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9. Goldblatt, Harry, and Steinberg, Bernhard: Peritonitis: I. Active Immunization Against Experimental B. Coli Peritonitis, Arch. Int. Med. **41**:42-43 (Jan.) 1928.

In group 2, one of the five rabbits survived the infecting dose of type XIX, and two of the five rabbits withstood the infecting dose of type II. The remaining seven rabbits died from twenty-four to forty-eight hours after the injection.

In group 3, two of the four rabbits resisted the infecting dose of type XIX pneumococcus, while none of the three rabbits which received the type II organisms survived.

In the control group, one of the five rabbits remained alive after receiving an injection of type II, while all the four rabbits which received the dose of type XIX succumbed.

The agglutination titer against the rough strain of type I pneumococcus was determined on a few of the serums in each group. There was no apparent correlation between the agglutination titer and the death or survival of the animal. However, the agglutination titers in group 1 ranged from 1:80 to 1:640, while those in group 2 were consistently higher, from 1:1280 to 1:2560. In group 3 the serums showed no agglutination with the organisms in any dilution.

SUMMARY

1. There was no noteworthy difference between the humoral antibodies against types I and II pneumococci in the blood of nephrotic children and the humoral antibodies against types I and II pneumococci in the blood of normal children.

2. It was not found possible to protect rabbits against intraperitoneal inoculation of 1,000 minimum lethal doses of virulent type II and type XIX pneumococci by means of nonspecific immunization with (*a*) type I pneumococci injected subcutaneously, (*b*) type I pneumococci injected intraperitoneally and (*c*) B. coli injected intraperitoneally.

3. Strains of pneumococci isolated from the peritoneal fluid or material from the throats of children with nephrosis were of group IV, with the exception of one strain, type II. In individual cases the strain from the throat always differed from the strain from the peritoneal fluid of the same patient.

4. Pneumococci were not isolated from any of eight vaginal cultures from four nephrotic and four normal children.

5. There was no apparent correlation between the agglutination titers of the serum of immunized animals and the resistance of these animals to intraperitoneal injection.

6. The agglutination titers were consistently highest (from 1:1,280 to 1:2,560) for the group of rabbits which were immunized intraperitoneally with the pneumococcus species-specific antigen as contrasted to those of animals immunized subcutaneously.

ACUTE APPENDICITIS IN THE EXANTHEMS

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Abdominal pain and vomiting are frequent symptoms of the onset of the exanthems. The attention of the observer is at first focused on the abdomen but is diverted when the exanthematous nature of the illness becomes apparent. Fortunately, the early abdominal symptoms of these diseases usually subside without local sequelae. Abdominal pain may recur, or it may set in for the first time during the period of eruption or shortly afterward. Like the prodromal pain, the pain with the onset of the rash is regarded lightly, because usually no serious complication occurs. It is our purpose to emphasize that there are exceptional cases in which prompt surgical intervention is required. In the presence of one of the exanthems, such as scarlet fever, the evaluation of abdominal symptoms becomes more difficult, but delay in the recognition of an emergency requiring surgical intervention may be avoided if the possibility of such an occurrence is borne in mind. It has been our experience that the acute abdominal complications of the exanthems are usually not recognized as early as is desirable.

During the five year period from Jan. 1, 1929, to Jan. 1, 1935, 26,462 patients were treated for communicable diseases at the Willard Parker Hospital. In 21 of these cases appendicitis occurred in close association with the acute illness. The incidence of this complication in the different diseases was as follows:

	No. of Cases	No. of Cases of Appendicitis	Percentage
Measles	6,357	11	0.17
Varicella	2,534	5	0.19
Scarlet fever	6,252	3	0.04
Diphtheria	4,140	0	
Pertussis	1,219	0	
Other diseases	5,960	2	0.03

(One case of streptococcic sore throat and 1 of anterior poliomyelitis.)

From the Willard Parker Hospital, the Department of Hospitals, the City of New York.

The incidence of appendicitis among all hospitalized patients was 0.09 per cent.

These incidences may be too high for the actual frequency of appendicitis in the exanthems, because the presence of this complication leads to the hospitalization of some patients who would otherwise have been cared for at home.

ACUTE APPENDICITIS WITH MEASLES

Incidence.—Of 6,357 patients with measles treated at the Willard Parker Hospital during the five year period, 11 suffered from acute appendicitis, an incidence of 0.17 per cent. The ages of these patients ranged from 3 to 8 years. There were 4 boys and 7 girls.

Relation to Stage of Exanthem.—Two of the 11 patients complained of abdominal distress before the appearance of the rash; the other 9 complained of abdominal distress after the rash developed. In the 2 cases the abdominal complaint was noted five and six days, respectively, before the rash appeared. When abdominal symptoms followed the appearance of the exanthem, they began the day after the rash developed in 3 cases, two days afterward in 2, three days afterward in 2 and four days afterward in 2.

Were it not for other facts, it would be far fetched, on the basis of 11 cases of coincidental occurrence, to suggest that the measles was responsible for the acute appendicitis. Only one other acute infection of childhood—varicella—shows a comparable incidence.

Pain referred to the right lower quadrant of the abdomen may occur coincidentally with catarrh of the upper respiratory tract in the prodromal stage of measles. This pain may be so conspicuous a feature of the onset that appendectomy may be considered and in some cases has been performed.

In the five year period under study there were transferred to the Willard Parker Hospital from other municipal institutions 4 patients in whom measles developed following appendectomy, the exanthem appearing in each case three days after operation. All these patients had had pain, tenderness and some rigidity in the lower right quadrant of the abdomen and had vomited. In none was the appendix sufficiently abnormal on microscopic examination to have warranted surgical intervention. Though these 4 cases do not suggest that similar incidents are frequent, patients in private hospitals in whom evidence of measles develops after appendectomy are not always transferred to a contagious disease hospital but are locally isolated. We have encountered 2 such instances. The syndrome of pseudo-appendicitis in the prodromal stage of measles may be more common than is generally known, and it may lead to unnecessary and untimely operative treatment. This is unfortunate because a general anesthetic may further injure the already inflamed respiratory system. On the other hand, in our series 2 cases

in which appendectomy was performed during the prodromal stage of measles are included in which perforation had already occurred at the time of operation.

From a study of these few cases we can offer no method of differentiating actual acute appendicitis from the syndrome of pseudo-appendicitis in the prodromal stage of measles. That the latter may be somewhat less complete or classic as to symptomatology is of little assistance in so protean a syndrome as acute appendicitis in childhood. In both conditions the temperature is higher and the upper respiratory tract shows more involvement than in simple appendicitis. However, since it is our impression that actual appendiceal inflammation and suppuration are uncommon in the preeruptive period of measles, we feel justified in stating that when abdominal distress occurs at a suitable interval after known exposure to measles the physician should have in mind the possible occurrence of pseudo-appendicitis. When strong evidence of appendicitis is present, it goes without saying that the usual surgical therapy of this condition must be applied. It is probably safer to operate when there is any doubt. One should keep in mind the possible ensuing exanthematous infection and pulmonary involvement in selecting the type of anesthesia.

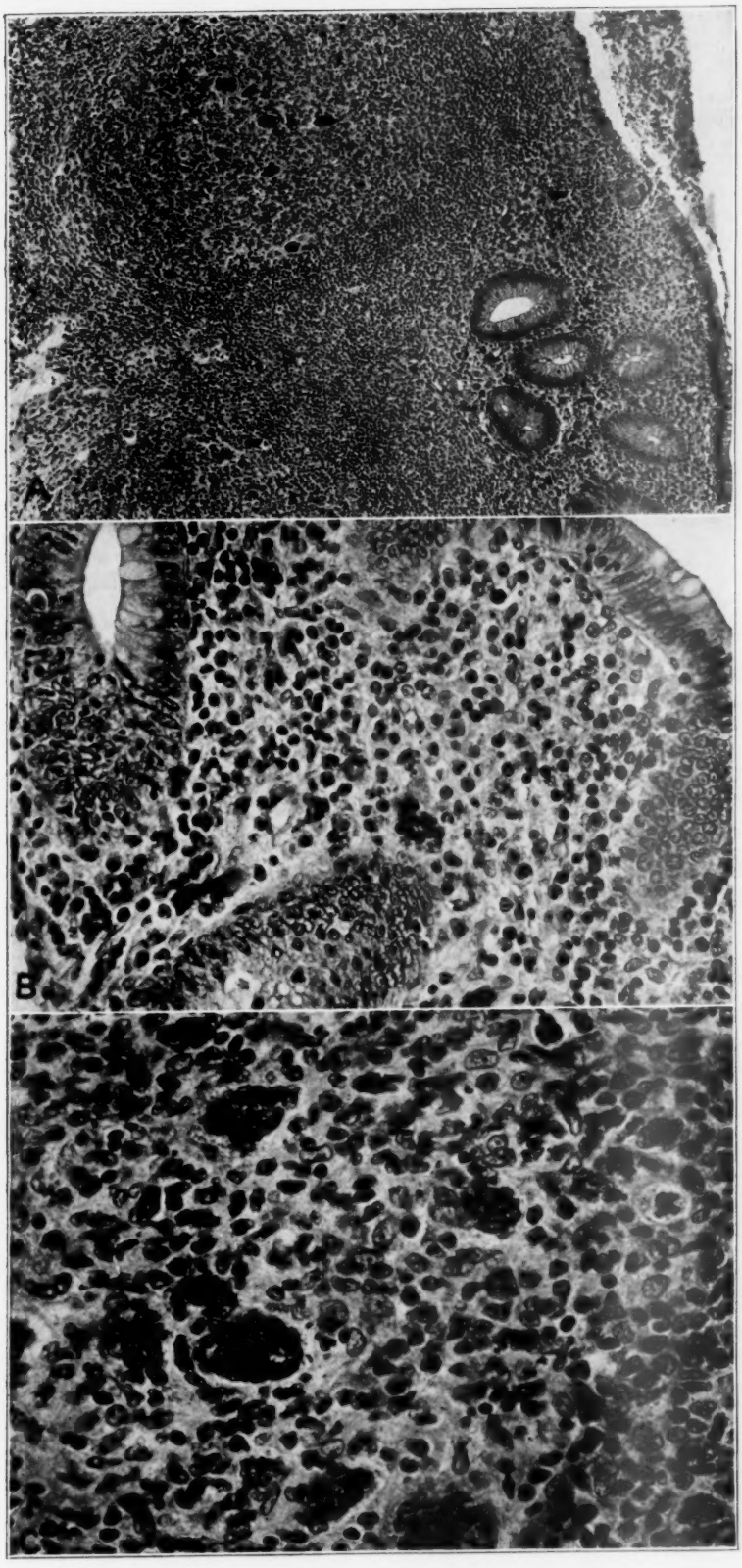
The specific giant cell reaction of the prodromal stage of measles has been observed in the lymphoid tissues of the appendix by several observers, most recently by Hathaway.[1] Three of the four appendixes removed during the preeruptive period because of symptoms of pseudo-appendicitis were obtainable for study through Dr. Louis R. Ferraro, of the Fordham Hospital, and Dr. C. R. Brown, of the Lincoln Hospital. All three organs showed the characteristic giant cells in the mucosal and submucosal layers. Dr. Paul Klemperer confirmed the microscopic observations. The accompanying photomicrographs, made by Dr. Lewis H. Koplik, show typical areas in these organs. Such specific histopathologic changes indicate at least that the appendix is involved directly or indirectly in measles.

Further considerations must be purely theoretical, and they prompt the following queries: Is the lower portion of the intestinal tract involved in the same catarrhal process as the upper respiratory passage? Is there correlation between the lymphatic changes and the pain in the right lower quadrant of the abdomen, which occur so exactly at the transition point between the incubation stage and the prodromal or invasive stage? Finally, does the presence of a prodromal reaction, as evidenced by the formation of giant cells, predispose appendiceal tissue to later secondary invasion during the eruptive stage?

1. Hathaway, Burr M.: Generalized Dissemination of Giant Cells in Lymphoid Tissue in Prodromal Stage of Measles, Arch. Path. **19**:819 (June) 1935.

EXPLANATION OF PLATE

A, photomicrograph of the mucosa of the appendix (× 85) showing two lymph follicles with markedly hyperplastic centers. Note the giant cells in the centers of the follicles as well as in the tunica propria surrounding the mucosal glands. The large number of mitotic figures in the glands of Lieberkühn may be seen even at this power as tiny black dots. There is no sharp boundary between the mucosa and the submucosa, which is infiltrated with lymphocytes. *B*, photomicrograph of the mucosa (× 350) showing polymorphonuclear infiltration and giant cells in the tunica propria (upper left corner) and mitotic figures in the mucosal glands. *C*, photomicrograph of the center of one of the lymphoid follicles (× 450), showing large numbers of irregular giant cell formations. Note the mitotic figures in upper right corner.


A
B
C

The following case history is worthy of presentation because it suggests a causal relationship between the catarrhal invasion of measles and the flare-up of appendiceal infection.

M. L., an 8 year old girl, became ill, as was later realized, at about the time she was exposed to measles. The symptoms, including low grade fever, vomiting and abdominal pain, made the family physician suggest appendicitis to the parents as a possibility. The next day the signs and symptoms subsided, and the child was soon out of bed. Ten days after the first attack she was suddenly taken acutely ill with severe abdominal pain which radiated to the right lower quadrant, followed by vomiting. There was direct and rebound tenderness over McBurney's point. The child was sent to a general hospital, and an operation was performed twelve hours after the onset of symptoms, disclosing an acutely inflamed, suppurative appendix covered with plastic exudate. Free fluid was present in that portion of the peritoneum. During the first few postoperative days the condition was marked by high fever, tachycardia, cough and epistaxis. Four days after the operation and five days after the onset of the symptoms the measles rash appeared, and the patient was transferred to the Willard Parker Hospital. The temperature dropped to normal in two days, and the subsequent course was uneventful.

The nine patients with posteruptive appendicitis in our series all showed perforation at the time of operation, despite the variable interval between the onset of the abdominal pain and the operation. One patient was operated on the second day and 1 each on the fourth, fifth and sixth days, respectively. It seems evident that the correct diagnosis of acute appendicitis was in each instance not made until perforation had occurred. This uniform delay existed in the face of fairly classic symptoms of appendicitis superimposed on the high fever, catarrh and rash of measles. There was no apparent correlation between the severity of symptoms or the findings and the time of onset of the abdominal distress after the appearance of the rash. White blood cell counts taken on the day of operation ranged between 12,000 and 21,000 and the polymorphonuclear counts between 76 and 89 per cent.

The appendixes were grossly necrotic and more or less gangrenous in all 11 cases in this series. In 9 cases there was local peritonitis and in 2 generalized peritonitis at the time of operation. Two patients died. No giant cell formation was noted in any of the sections of the appendixes removed during the eruptive or posteruptive stage. The bacteriologic data were incomplete.

ACUTE APPENDICITIS COMPLICATING VARICELLA

Among 2,534 consecutive patients treated for varicella at the Willard Parker Hospital during the five year period between Jan. 1, 1929, and Dec. 31, 1934, 5 suffered from acute appendicitis while in the hospital.

CASE 1.—E. L., a girl aged 6 years, was stricken with sudden abdominal pain, accompanied with emesis and a temperature of 102 F. The next day she was constipated and had persistent pain and elevation of the temperature. On the third

day, despite a drop in the peak of the temperature to 99 F., the pain grew more intense, vomiting occurred several times and a varicella rash appeared. The patient was not sent to the hospital until the following day. On this, the fourth day of illness, there was a moderately heavy rash typical of chickenpox. The temperature was 105 F. Rigidity and tenderness were most marked in the right lower quadrant of the abdomen. At operation the appendix was acutely inflamed, swollen, discolored and perforated at the tip, with localized peritonitis about it. The appendix was removed, and a drain was inserted. The following day the temperature dropped to 102 F.; it hovered at that level for a week and then remained at 101 F. for several days before reaching normal. Except for slight infection of the wound, recovery was uneventful. Pathologic examination showed acute phlegmonous appendicitis, approaching gangrene at the tip, with hemorrhagic purulent exudate throughout.

CASE 2.—C. S., a 6 year old boy, had an illness which began with vomiting. The next day he complained for the first time of abdominal pain just when the rash of chickenpox appeared. On the third day the temperature was 101 F., and the vomiting continued. When the patient was hospitalized, on the fourth day, examination showed a heavy varicella rash and pain, rigidity and tenderness over McBurney's point. The temperature was 102 F. Operation disclosed a gangrenous appendix, with localized peritonitis. The appendix was removed and a drain inserted. The postoperative temperature fluctuated between 102 and 103 F. for a week. On the nineteenth postoperative day the cutaneous lesions were healed sufficiently to permit discontinuation of isolation, and the patient was discharged. Microscopic examination revealed gangrenous inflammation of the entire wall of the appendix.

CASE 3.—J. G., an 8 year old boy, broke out with a heavy chickenpox rash. The next day he vomited and complained of epigastric distress. The following day the vomiting continued, the temperature was 101 F. and the patient entered the hospital. Tenderness and rigidity were noted in the right lower quadrant of the abdomen. Operation revealed an acutely inflamed, swollen, discolored appendix. The organ was removed, and drainage was instituted. Postoperatively the temperature reached 105 F. but subsided gradually during the next few days. At the time of the patient's discharge, on the twenty-first day after the onset of the illness, the wound was almost completely healed. Pathologic section showed acute phlegmonous appendicitis.

CASE 4.—Y. C., an 8 year old girl, had a heavy varicella rash. Three days later she vomited and complained of abdominal pain. She was not hospitalized until the seventh day of the illness. At the time of her admission to the hospital the temperature was 103 F., and pain, tenderness and rigidity were noted in the right lower quadrant of the abdomen. Operation revealed that the appendix was swollen and gangrenous along its entire length, ruptured at the tip and surrounded by early evidence of abscess formation. The appendix was removed, and a drain was inserted. The temperature hovered above 102 F. until the eighth postoperative day, when an abscess in the wound caused a rise to 104 F. This subsided quickly with further drainage. The patient was discharged thirty-two days after the onset of the illness. Pathologic section showed acute inflammation, with extensive necrosis of the tissues.

CASE 5.—A 3 year old girl became ill with pain in the right lower quadrant of the abdomen, followed by repeated vomiting and fever. She was given a dose of castor oil, and several bowel movements resulted. The next day, when she was admitted to a general hospital, the temperature was 101 F. The entire abdomen was held rigid, and there was considerable tenderness in the right lower quadrant.

The white blood cell count was 7,800, with 79 per cent polymorphonuclears. At operation there was a moderate amount of greenish yellow purulent exudate in the peritoneal cavity. The appendix was gangrenous and perforated. It was removed, and drainage was instituted. Culture showed only Bacillus coli and Staphylococcus aureus. The temperature fluctuated daily between 99 and 101 F. Three days after operation the first vesicles appeared on the skin. The patient was transferred to the Willard Parker Hospital. A moderately severe eruption typical of varicella developed. The low grade temperature and the drainage from the wound continued for two weeks longer.

Comment.—It is difficult to say whether or not there is any but a coincidental association between varicella and appendicitis. It is true that the incidence of appendicitis is appreciably higher in varicella than in the other conditions studied, with the exception of measles, but it must be borne in mind that the percentage of patients hospitalized is much lower for chickenpox than for the other diseases. In the more than 2,500 cases of varicella, simple and complicated, appendicitis did not develop during hospitalization. The almost simultaneous onset of the two conditions in all the cases cited suggests a possible relationship. In 3 of the cases the abdominal distress began during the prodromal stage of chickenpox, one, two and four days, respectively, before the appearance of the rash. In the others the abdominal distress set in while the rash was still erupting, one and three days, respectively, after the first vesicle was noticed.

The presence of varicella did not seem to modify the clinical picture of appendicitis. Except for a slightly higher temperature than average, the sequence and nature of symptoms were classic in all 4 cases. Conversely, the varicella was not consistently modified by the existence of the complication. The rash was heavy in 3 cases and moderately so in the other 2.

In 4 of the 5 cases operation revealed that the appendix was ruptured. In all cases it showed more than the usual degree of necrosis, approaching gangrene. This may possibly be attributed to the delay in hospitalization which occurred in all but 1 of the cases of perforation.

Histologic study revealed no specific or characteristic changes. There were no lesions comparable to the cutaneous vesicles of varicella or to the lesions often present on the buccal and palatal mucosa. No bacteriologic reports are available.

ACUTE APPENDICITIS IN SCARLET FEVER

We have encountered a number of cases of acute appendicitis in which the prodromal symptoms and rash of scarlet fever developed shortly after operation. A proper classification of the condition is surgical scarlet fever, and such cases must accordingly be excluded from this study, which presents appendicitis as part or complication of scarlet fever.

During the five year period under analysis 6,252 patients with scarlet fever were treated. In only 3 instances was there intimate association with acute appendicitis. It must consequently be concluded that this is a rare complication or concomitant of scarlet fever.[2] In fact, we offer no rebuttal to the reasonable contention that this low incidence falls within the expected coincidental frequency of the two conditions.

The 3 cases studied were as follows:

CASE 1.—A 4 year old girl recovered from a moderately severe attack of scarlet fever. On the twenty-third day of illness the throat retained some congestion, the cervical glands were still palpably enlarged and desquamation was at its height. Diarrhea set in and was shortly followed by vomiting and abdominal pain. The temperature rose to 102 F. All the symptoms except vomiting persisted until the patient's admission to the hospital, three days later. Tenderness was generalized but most marked in the right lower quadrant of the abdomen. The total leukocyte count was 13,600, with 76 per cent polymorphonuclears. Operation revealed an acutely inflamed appendix bound down by plastic exudate and bathed in free pus. The appendix was removed, and drains were inserted. The temperature reached 104 F. during the first two postoperative days and thereafter gradually dropped to normal. The wound healed promptly.

CASE 2.—A 10 year old boy was suddenly taken ill with fever, vomiting and pain in the right side of the abdomen. A private physician told the parents that the child had acute appendicitis, but for some reason operation was postponed. Two days later the scarlet rash and the typical appearance of the facies and tongue were recognized. The next day, when the boy was admitted to the hospital, the condition seemed to be typical of uncomplicated scarlet fever of moderate severity. On the seventh day of illness the boy told the nurse on one occasion that he had slight discomfort in the abdomen. On the eleventh day of illness he complained of moderate pain in the right side of the abdomen and felt nauseated. There was moderate tenderness on the right side of the abdomen, and bimanual rectal examination disclosed a tender mass in the right lower quadrant. The impression of an appendiceal abscess was confirmed at operation. The appendix was gangrenous and lying in a walled-off abscess. Appendectomy was performed, and drains were inserted. Abdominal distention and vomiting were present for a few days. Six days after the operation the temperature again rose to 103 F. Signs of beginning consolidation were present in the lower lobe of the left lung. Classic lobar pneumonia was present for the next nine days, when signs of empyema appeared in the left side of the chest. After a week of treatment by aspiration the pus became thick enough to warrant intercostal drainage. Fifty-six days after the onset

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2. During the years studied 5 patients with scarlet fever were observed who had acute generalized peritonitis due to Streptococcus haemolyticus, in some instances simulating acute appendicitis. In 2 of these cases the preoperative diagnosis was infection of the mesenteric lymph nodes and peritonitis; in 2 cases, acute appendicitis and in 1 case perinephric abscess. The symptoms were nausea and vomiting, distention, marked tenderness of the abdomen, high fever annd rapid pulse rate. In 2 cases there was pain in the left lower quadrant of the abdomen, and in 2 cases a mass was felt. In 2 cases the hemorrhagic inflammation of the walls of the appendix was attributed to the general peritoneal involvement by the pathologist, Dr. Lawrence W. Smith.

of the illness the patient was discharged from the hospital with all wounds completely healed.

In this case the original suspicion of acute appendicitis was pushed into the background by the appearance of frank scarlet fever. For the same reason a proper value was not placed on the later complaint of vague but persistent abdominal pain until definite abscess formation was manifest.

No bacteriologic reports are available.

CASE 3.—S. B., a 12 year old girl, suddenly became ill with fever and angina, soon followed by a typical scarlet rash. On the fifth day of illness there was recurrence of fever, associated with abdominal pain and vomiting. The next day, when the child was admitted to the hospital, the temperature was 104 F. She showed generalized abdominal rigidity and tenderness. The white blood cell count was 24,700 with 93 per cent polymorphonuclear cells. Operation disclosed a retrocecal appendix, acutely inflamed and bound down with recent adhesions. There was a fibrinous exudate generalized over the peritoneum. The appendix was removed, and drains were inserted. The temperature fluctuated below 102 F. for ten days more. On the twenty-third day of illness urinary evidences of nephritis, much albumin, red blood cells and casts were noted. The nonprotein nitrogen content was not above 44 mg. per hundred cubic centimeters, and the blood pressure was not above 110 systolic and 70 diastolic. No edema appeared. A low grade elevation of the temperature, positive urinary findings and moderate drainage from the wound persisted up to the time of the patient's discharge from the hospital, fifty-one days after the onset of the illness.

CONCLUSIONS AND SUMMARY

Appendicitis occurred more frequently as a complication of varicella (2,534 cases, 0.19 per cent) and measles (6,357 cases, 0.17 per cent) than of the other infectious diseases studied—scarlet fever, diphtheria, pertussis, poliomyelitis and other disorders (17,571 cases, 0.02 per cent).

Appendicitis occurred in only 3 of 6,252 cases of scarlet fever.

Symptoms simulating those of acute appendicitis often occur at the end of the incubation period, just at the beginning of the catarrhal invasion of the upper respiratory tract. At this same period specific histopathologic changes are present in the appendix, in the form of collections of giant cells in the mucosal and submucosal layers. In some cases appendectomy is performed unnecessarily.

During the prodromal period of measles acute appendicitis is very unusual. In the eruptive period it is not a rare occurrence, and at this time early perforation and extensive tissue necrosis are the rule. The appendicitis is usually not recognized before perforation because attention is focused on the respiratory and cutaneous aspects of the measles.

It is urged that physicians recognize that abdominal symptoms associated with the exanthems, especially in measles and varicella, may be due to acute appendicitis.

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Case Reports

EXOPHTHALMIC GOITER IN A BOY TWO AND ONE-HALF YEARS OF AGE

REVIEW OF THE LITERATURE

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In 1923 Cowden [1] was unable to find in the literature a report of hyperthyroidism in a boy under 10 years of age, but since that time several such reports have appeared. Helmholtz [2] cited the case of a boy aged 3 years who had had symptoms of hyperthyroidism since the age of 11 months. The same author, in reporting 30 cases of exophthalmic goiter in children under 14 years of age, found that the incidence in boys was extremely low as compared with that in girls. In his series there were only 4 boys as compared with 26 girls.

Elliot [3] reported hyperthyroidism in a girl 2½ years old on whom an operation was performed at the age of 2 years and 10 months. After preliminary ligations, a right subtotal lobectomy was successfully performed, and the patient obtained complete relief from all symptoms. The onset of hyperthyroidism had been at the age of 1 year. Braid and Neale [4] reported a fatal outcome in a case of hyperthyroidism in a girl 2½ years of age. At this time they were able to find only 2 cases of recovery in children under 5 years. The first was Dreschfeld's,[5] in which a child 3 years of age recovered after the use of belladonna and a pancreatic emulsion. It is difficult to estimate the severity of the disease in this case. The second was that of the child of 3 years, previously referred to, in Helmholtz' series.

1. Cowden, Charles: Exophthalmic Goiter in the Child, Tr. South. S. A. **36**:75-83, 1923.

2. Helmholtz, H. F.: Exophthalmic Goiter in Childhood, J. A. M. A. **87**: 157-162 (July 17) 1926.

3. Elliot, P. C.: Exophthalmic Goiter Before One Year of Age, J. Pediat. **6**:204-210 (Feb.) 1935.

4. Braid, F., and Neale, A. V.: Case of Exophthalmic Goiter, Arch. Dis. Childhood **5**:229-232 (June) 1930.

5. Dreschfeld, J.: Notes on Graves' Disease, Practitioner **57**:135, 1896.

Stephen [6] reported a case of hyperthyroidism in a girl 3½ years of age. The onset of the disease was placed at the age of 2½ years, and although definite hyperthyroidism was present, the child recovered without an operation.

Kerley [7] reported a case of exophthalmic goiter in a girl of 3½ years. The diagnosis was apparently perfectly clear, but the disease subsided spontaneously after rest and treatment with solution of potassium arsenite and iron.

In Dinsmore's series,[8] 48 cases of hyperthyroidism in children under 14 years of age were reported, but there was no case in a boy under 5 years. In the case of a girl of 7, the onset of the disease was placed at the age of 2½ years.

White [9] reported the presence of exophthalmic goiter and tachycardia in an infant born of a mother who had active hyperthyroidism. The child lived only thirty-five hours. The thyroid gland showed hyperplasia. Although this is the youngest patient with hyperthyroidism whose case appears in the literature, it is extremely difficult to determine, in view of the fact that the mother had exophthalmic goiter, whether the child had acquired the disease independently or from the mother through the blood stream.

Helmholtz [2] quoted Sattler, who had reported 184 cases of hyperthyroidism in children, representing an incidence of 5.3 per cent of his total of 3,477 cases of hyperthyroidism. This unusually high incidence of hyperthyroidism in children and the fact that the symptoms listed were less severe in every respect than in the cases recorded by Helmholtz, Dinsmore and others in the American literature lead us to believe that the disease is somewhat less severe in Germany. It is interesting to note that the incidence of hyperthyroidism in Sattler's series was more equally distributed between the sexes, there being 4 boys to 7 girls in the age group of from 1 to 5 years. Therefore, it is not improbable that some of these cases represented the thyroid hyperplasia of iodine deficiency rather than true exophthalmic goiter.

Ochsner and Thompson [10] described exophthalmos in a boy 5 weeks of age. This child had a turret head, and no mention was made of

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6. Stephen, E. H. M.: Exophthalmic Goiter in Girl Aged Two Years, M. J. Australia **1**:29-30 (Jan. 7) 1933.

7. Kerley, C. G.: Exophthalmic Goiter in Girl Three and One-Half Years of Age, Arch. Pediat. **48**:61-62 (Jan.) 1931.

8. Dinsmore, R. S.: Hyperthyroidism in Children, Surg., Gynec. & Obst. **42**:172-176 (Feb.) 1926.

9. White, Clifford: A Foetus with Congenital Hereditary Graves' Disease, J. Obst. & Gynaec. Brit. Emp. **21**:231-233, 1912.

10. Ochsner, Albert J., and Thompson, Ralph L.: The Surgery and Pathology of the Thyroid and Parathyroid Glands, St. Louis, C. V. Mosby Company, 1910, p. 193.

the pulse rate or of diagnostic studies. Patterson [11] reported the case of a girl with hyperthyroidism which dated from the age of 4 months. The child was, however, 14 years old when she first came under Dr. Patterson's observation. Exophthalmos was the chief sign of hyperthyroidism, and the early history was somewhat obscure.

Lahey [12] mentioned that he performed a thyroidectomy on a child of 3 years, but the sex of this child was not stated.

Beilby and Carlton [13] reviewed the literature in 1931 and found reports of 8 cases of hyperthyroidism in children under 5 years of age. Two of these were from the Mayo Clinic series (ages, 5 and 3 years), 1 from the Lahey Clinic (age, 3 years), 1 reported by Braid (age, 2½ years), 1 reported by Barrett (age, 2½ years), 1 reported by Schkarin (age, 4½ years) and 1 reported by Klaus (age, 9 months). In the report of the last case the sex of the patient was not stated, nor were any convincing diagnostic tests made in that case; the disease disappeared without an operation. Sherman's case of hyperthyroidism in a girl of 2½ years was also mentioned. This child was later seen at the Cleveland Clinic; she recovered without an operation. Beilby and Carlton reported a case of active hyperthyroidism in a girl of 2 years and 9 months. Thyroidectomy was performed in one stage at the age of 2 years and 10 months, and the postoperative course was entirely uneventful.

In a series of 4,300 cases of exophthalmic goiter, Bram [14] found 102 cases in children. Only 5 of these were in boys. Two patients were from 2 to 3 years old; 3, from 3 to 4, and 5, from 4 to 5. No mention was made of the sex of the children in the age group of from 2 to 3 years, nor was there any report that operations were performed.

It is apparent that, while a number of cases of hyperthyroidism in children appear in the literature, proved hyperthyroidism before the age of 5 years is extremely rare. Only 7 patients—those of Helmholtz, Braid and Neale, Lahey, Stephen, Beilby and Carlton, Kerley and Elliot—were carefully observed, fully reported on in the literature and shown to have had unquestionable hyperthyroidism before the age of 5 years (table). The following case is unique in that the patient is the youngest boy with active hyperthyroidism yet reported on. Although

11. Patterson, Donald: Hyperthyroidism Dating from Infancy, Proc. Roy. Soc. Med. **28**:832-833 (May) 1935.

12. Lahey, F. H.: Primary Hyperthyroidism in Children, S. Clin. North America **9**:1327-1330 (Dec.) 1929.

13. Beilby, G. E., and Carlton, J. G.: Exophthalmic Goitre in Children, New York State J. Med. **31**:1329-1332 (Nov. 1) 1931.

14. Bram, I.: Exophthalmic Goiter in Children of Ten and Under, Pennsylvania M. J. **37**:45-48, 1934.

Helmholtz dated the onset of symptoms in his patient at the age of 11 months, the child was not seen or observed until the age of 3 years. The case reported here is also unique in that the patient is the youngest child described in the literature on whom successful thyroidectomy has been performed.

REPORT OF CASE

The child was born on Aug. 30, 1933. He was a full term infant, and delivery was normal, labor lasting seven hours. The mother vomited during the entire pregnancy, but there were no postnatal complications. The child cried well at birth. No cyanosis, convulsions or nursing difficulties occurred, and no hemorrhage, paralysis or deformity was evident. The weight at birth was 10 pounds (4,535 Gm.).

The family history was entirely irrelevant, neither the mother nor the father having had any evidence of goiter. There were no other children. There was no family history of tuberculosis, syphilis, allergy, diabetes, goiter or nervous disease. The child did well on breast milk for one year and was then weaned to cow's milk. Solid foods were added between the ages of 9 months and 1 year.

Cases of Proved Hyperthyroidism in Children Under 5 Years of Age Reported in the Literature Written in English

Author	Age	Sex	Treatment	Outcome
Helmholtz	3	M	Thyroidectomy	Cure
Braid and Neale	2½	F	Thyroidectomy	Operative death
Lahey	3	Not stated	Thyroidectomy	Cure
Stephen	2	F	Conservative	Cure
Bellby and Carlton	2¾	F	Thyroidectomy	Cure
Kerley	3½	F	Conservative	Cure
Elliot	2½	F	Thyroidectomy	Cure

He sat up at 6 months, walked at 8½ months and talked at 1 year. The teeth appeared early, at approximately 6 months. The second year was normal with the exception of several instances of gastro-intestinal disturbance and a few uncomplicated head colds. No immunization was carried out. On Aug. 1, 1935, at the age of 23 months the child had an attack of dysentery characterized by frequent bloody stools. His height at that time was 38 inches (96 cm.) and his weight 30 pounds (13.6 Kg.). He was considerably dehydrated, but there was evidence of hyperthyroidism.

On April 1, 1936, at the age of 2 years and 7 months, the child was examined by one of us (J. L. B.) because of abdominal pain and nervousness. For the previous five days he had complained of abdominal pain and had been vomiting. He had no appetite. The stools were normal. He was extremely nervous, and this condition had been present for about six months. He slept poorly, but he never had slept well. He had not gained in weight since the attack of diarrhea seven months previously. The mother stated that he perspired excessively and was easily excited. His appetite until five days before had been good.

Physical examination showed the temperature to be 102 F. by rectum, the height 40½ inches (103 cm.) and the weight 31½ pounds (14.3 Kg.). The normal weight at this age is 37 pounds (16.8 Kg.). The child was extremely nervous and apprehensive, sweating profusely and crying constantly. There was definite exophthalmos of both eyes. Both ear drums were dull. The nostrils were open, and there was no discharge. The mouth was normal, but the tongue was heavily coated.

The throat was red, and there was a postnasal discharge. The submaxillary and axillary lymph nodes were palpable. There were visible pulsations over the carotid artery, and the thyroid gland was large and soft. The chest was normal in shape. The respirations were rapid. The lungs were clear; the heart was observed by percussion to be slightly enlarged; the pulse rate was 150, and the blood pressure was 120 systolic and 60 diastolic. There was a systolic apical murmur which was not transmitted. The abdomen was soft; the edge of the liver was palpable 3 fingerbreadths below the costal margin on the right side. The spleen, likewise, was palpable. The genitalia and the extremities were normal. There was marked tremor of the extended fingers. The child's parents stated that although some months previously he could walk quite well without falling, recently he had appeared weak and had stumbled, staggered and fallen a great deal. In addition, they thought that his speech was more unintelligible than formerly. The development of speech, which had begun at the age of about 1 year, had not progressed as rapidly as they had expected, but it was extremely difficult to tell anything about the child's speech because he was crying constantly. There was no weakness of the muscles of the back, but the child stood up only with considerable difficulty, and there seemed to be definite weakness of the quadriceps muscles. The coordination of the hands was good, and the awkwardness, stumbling and peculiar gait could all be attributed to weakness of the legs.

Urinalysis at this time gave entirely negative results. The child was sent home, put to bed and given ⅛ grain (0.008 Gm.) of soluble phenobarbital and 3 grains (0.195 Gm.) of acetylsalicylic acid in syrup every four hours. The diet was modified, and the parents were instructed to return in one week.

On April 12 the acute nasopharyngitis had cleared up, but the child was still extremely nervous and slept poorly. The appetite was excellent again. He continued to sweat freely and was easily frightened. The weight was 30½ pounds (13.8 Kg.), and the temperature was 99.2 F. by rectum. In view of these findings, a diagnosis of hyperthyroidism was made, and the patient was referred to the Cleveland Clinic.

On examination at the clinic, approximately the same findings were noted except that the child was utterly unmanageable (fig. 1). The excitement of the trip and the unfamiliar surroundings made him cry constantly, and at any attempt to approach or examine him he screamed and resisted. The edge of the liver could be felt. Examination was extremely unsatisfactory because of the lack of cooperation. On admittance to the hospital, the pulse rate was consistently 160.

Laboratory Studies.—Urinalysis gave entirely normal findings. Examination of the blood showed 6,070,000 red cells, 78 per cent hemoglobin, 13,100 white cells, 42 per cent neutrophils, 1 per cent eosinophils and 57 per cent lymphocytes. The sugar content of the blood was 182 mg. per hundred cubic centimeters during fasting, and the cholesterol content was 136 mg. The Wassermann and Kahn reactions were negative. A twenty-four hour specimen of urine showed a total excretion of creatinine of 0.108 Gm. The excretion of creatine during the same period was 0.152 Gm. A recheck of the blood cholesterol several days later again showed 136 mg., and a second test of the blood sugar during fasting showed 139 mg. A negative Friedman test indicated that there was no excess of gonadotropic substance in the urine. The blood iodine content was 14.9 micrograms per hundred cubic centimeters, a figure just above the upper limit of normal. Roentgen examination of the epiphyses of the wrist showed development of the bones approximating that of a 5 year old child. A roentgenogram showed the sella turcica to be normal in size and shape. The skull showed no evidence of increased intracranial pressure and no other abnormality. Roentgen examination

Fig. 1.—A photograph of the patient before the operation. Emotional strain is evident. Exophthalmos is not evident in this photograph because the patient was crying and the eyes were half closed.

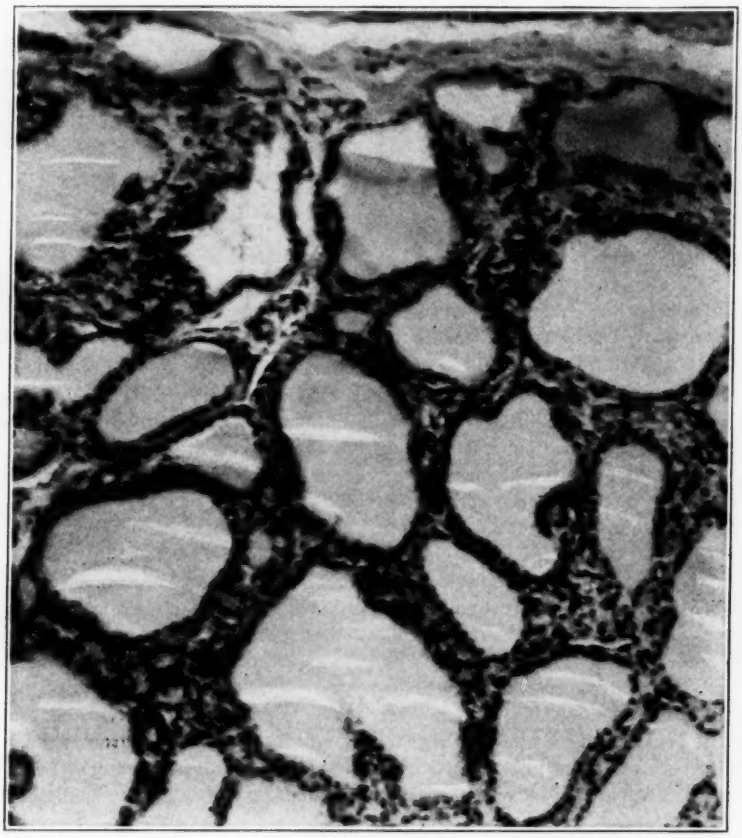

Fig. 2.—A photomicrograph of the tissue removed (× 150).

of the chest showed no abnormality. Examination of the eyes showed widened palpebral fissures and early exophthalmos. Actual measurements were impossible owing to lack of cooperation. Dental examination showed all the deciduous teeth to be present. The physiologic age as shown by the teeth was estimated to be from 3 to 3½ years. There was no dental caries.

Course.—The child was given 4 minims (0.24 cc.) of compound solution of iodine three times daily and 5 grains (0.325 Gm.) of sodium bromide three times daily. His weight at entry was 36½ pounds (16.5 Kg.); it had fallen to 35 pounds (15.9 Kg.) at the end of the fifth day, but on the twelfth day of hospitalization it had risen to 38 pounds (17.2 Kg.). The pulse rate, which was 160 at entry, fell gradually over a period of twelve days to 120 and remained stabilized at about that level. On May 15, when the child was 2 years and 8½ months old, a subtotal thyroidectomy was performed by Dr. George Crile Sr., with the patient under anesthesia induced by tribromethanol, 100 mg. per kilogram of body weight being given. The gland was about five times the normal size. It was extremely vascular and somewhat friable. The major portion of both lobes was removed, the weight of the tissue removed being 33 Gm.

The pathologic diagnosis was hyperplastic and moderately involuting goiter. There was little increase in stroma and little lymphoid tissue (fig. 2). No adenomas and no parathyroid glands were present in the specimen removed.

The immediate postoperative course was stormy, the temperature rising to 105 F. and the pulse rate to 170. The temperature, however, was always controllable by the administration of 5 grains (0.325 Gm.) of acetylsalicylic acid, and the child remained conscious and took fluids throughout the entire postoperative period. The oxygen tent was used constantly for several days. On the third day postoperatively, acute infection of the respiratory tract and acute follicular tonsillitis developed. The temperature again rose to 105 F., but the pulse rate did not rise above 160. After this the temperature rapidly returned to normal.

The child was discharged on the seventeenth postoperative day, the pulse rate at this time varying between 95 and 110. He was still nervous and apprehensive but was more quiet than at the time of his entry to the hospital. Several months after his discharge he was gaining weight and strength, was less nervous and was improving steadily in every way.

COMMENT

Although the finding of persistent tachycardia, nervousness, loss of weight, sweating, tremor, exophthalmos and goiter established the diagnosis of hyperthyroidism beyond any question, the clinical picture was somewhat obscured by the marked muscular weakness. This weakness was so pronounced that the patient walked with a stagger and frequently fell. In addition, the extreme nervousness and apprehension left the child in constant fear, so that it appeared as if there were definite mental retardation. Because these neurologic signs were not clearly understood, a roentgen examination of the skull was made to rule out the possible presence of increased intracranial pressure. The high blood iodine level and the low cholesterol level were findings perfectly consistent with hyperthyroidism. It is a well known fact that epiphysial closure is delayed in hypothyroidism during childhood, and it is hence interesting to note that the development of the bones of this

2½ year old child was estimated from a study of the epiphyses to be that of a 5 year old child. Likewise, the dental development was somewhat advanced for the age.

Another interesting feature of this case is the fact that a dose of 100 mg. of tribromethanol per kilogram of body weight quieted the child for only about three quarters of an hour, at the end of which time he asked for candy. When severe hyperthyroidism is superimposed on the normally high metabolism of children, they are remarkably tolerant of depressive drugs. Morphine sulfate in doses of ⅛ grain (0.008 Gm.) was given hypodermically during the postoperative period, but practically no depression of respiration was noted.

SUMMARY

Seven cases of clearcut hyperthyroidism in children under 5 years of age have been reported in the American literature.

A case of hyperthyroidism in a boy 2½ years of age is reported.

A review of the literature shows that there is no report of a case of hyperthyroidism in a younger boy in which a diagnosis was made and confirmed by adequate clinical and laboratory investigation.

Our patient is also the youngest child for whom a successful thyroidectomy for hyperthyroidism has been reported.

COINCIDENT PULMONARY TUBERCULOSIS AND BRONCHIECTASIS IN CHILDREN

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The differential diagnosis between pulmonary tuberculosis and bronchiectasis is a frequent problem when dealing with adult patients. Basilar lesions of a chronic infectious nature are seen less frequently in children but often enough so that the determination of their nature is important. Because of the often quoted adage, "Apical lesions should be considered tuberculous until proved otherwise and basilar lesions should be considered nontuberculous until proved otherwise," the fact may be lost sight of that both bronchiectasis and tuberculosis may be present in the same patient in the same localized pulmonic area. That tuberculosis may be a cause of localized bronchiectasis through changes in the bronchi by prolonged tuberculous ulceration has, of course, been recognized for a long time; and Wallgren [1] has reported bronchiectasis in children following healed primary epituberculous complexes, in which the sputum gives no evidence of tuberculous infection or is absent. In proof of the fact that the two conditions may occasionally occur in the same child and probably independently of each other, two cases are presented here:

REPORT OF CASES

CASE 1.—A. F., a girl, was first seen by me in 1922, when she was 2 years of age. At this time she became a ward of the children's agency and reported for a routine physical examination. A satisfactory family history was not obtained. She was found to have hypertrophied tonsils and gonorrheal vulvovaginitis. The latter was treated and cured, and an adenotonsillectomy was performed six months after her first visit. When the child was 3 years of age an indirect, incomplete reducible inguinal hernia was found on the right side and later repaired.

When she was 5 years old a slightly productive cough developed, the tuberculin test gave a positive reaction and a roentgenogram of the chest showed evidence of hilar inflammation (fig. 1 *A*). Shortly afterward chronic maxillary sinusitis developed, accompanied by occasional attacks simulating asthma. Vincent's angina developed when the girl was 9 years of age, but it receded. Her general condition at that time was good, and her weight was usually near the upper limits of normal

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1. Wallgren, Arvid: Primary Pulmonary Tuberculosis in Childhood, Am. J. Dis. Child. **49**:1105-1136 (May) 1935.

for her age and height. Roentgenograms, however, showed steadily increasing hilar markings, and fluid showed in both antrums when the patient was 10 years old. After having been scheduled for antral washing, she entered the children's ward of the Stanford University Hospital on account of the development of typical

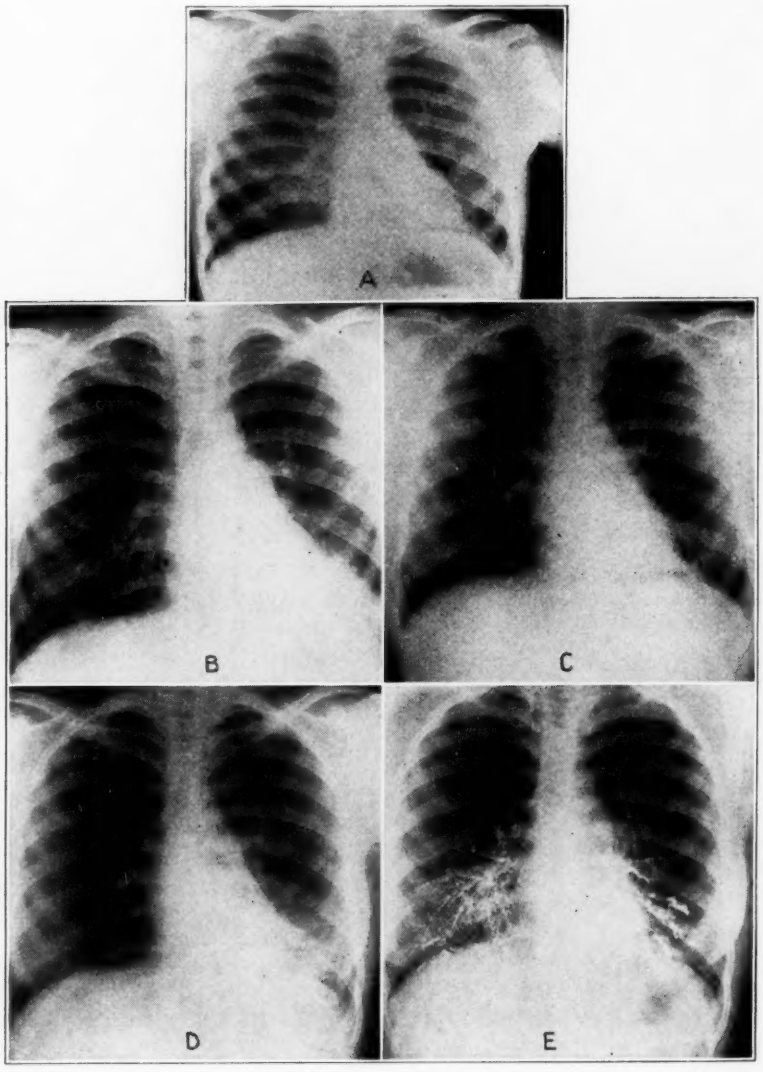

Fig. 1 (case 1).—*A*, hilar inflammation in the patient (aged 5 years), who at that time showed a positive reaction to the tuberculin test; *B*, basilar inflammation in the patient (aged 12 years), who then had râles at both bases; *C*, clearing of the lungs sixteen months after the roentgenogram in figure 1 *B* was taken; *D*, return of the densities at the base of the left lung in the patient (aged 14 years), and *E*, appearance of the lungs after the injection of iodized poppy-seed oil, shortly after the roentgenogram in figure 1 *D* was taken.

erythema nodosum, the course of which lasted about four weeks. The intracutaneous tuberculin test gave a strongly positive result, and the markings shown by roentgenograms were still further increased in extent. Clinical recovery seemed complete, and the patient was well for about two years. Approximately one year after the patient had erythema nodosum, a brother, living in the same foster home, suffered from the same condition, which ran a course similar to that in the case of the sister.

When she was 12 years of age she had a sore throat and a rash, which was probably scarlet fever, and afterward a cough developed, which was productive, especially in the morning. There were râles at the base of each lung, and roentgenograms of the chest, taken on Nov. 4, 1931, showed basilar inflammatory processes (fig. 1 *B*). The sputum obtained on postural drainage was slight but was greenish. No acid-fast bacilli were found, and constitutional symptoms were absent. The cough and the production of sputum ceased, and the next year physical and roentgenographic examination of the chest showed much clearing of the lungs (fig. 1 *C*).

At the age of 14 years the patient again began to cough, and the sputum raised became about 15 cc. per day. Roentgenographic examination revealed a return of the densities in the lungs, especially at the base of the left lung (fig. 1 *D*). When iodized poppy-seed oil 40 per cent was injected, many bronchiectatic cavities at the base of the left lung were seen, with a normal bronchial tree at the base of the right lung (fig. 1 *E*). Five examinations of sputum, the last made in January 1935, gave no evidence of tuberculosis. One inoculation of a guinea-pig also gave a negative result. The rate of sedimentation of the blood was 13 mm. in one hour. In February, 1935, after the sputum had been concentrated, acid-fast bacilli were found in it. After this, eleven of twelve specimens submitted at monthly intervals contained bacilli. The sputum produced when the patient was ambulatory seemed slight, but when she was asked to stoop far over and to cough, she always was able to raise material.

The general condition of the patient, who is 15 years of age at the time this is written, has not changed materially within the past year, except that she has had two attacks of phlyctenulosis.

Case 2.—E. A., a girl, was first seen in January 1930, at the age of 9 years. She had become a ward of the children's agency because of the death of her mother from tuberculosis. An older brother also had died of the disease. The patient had just been dismissed from the children's tuberculosis ward of the San Francisco Hospital, where she had spent a year, with the diagnosis of childhood tuberculosis. Physical examination showed normal weight and development. There was much anterior nasal discharge of mucopus, and, on the patient's gagging, pus descended from the nasopharynx. A roentgenogram of the chest showed only moderate hilar markings (fig. 2 *A*). A roentgenogram of the sinuses showed all except the sphenoid filled with abnormal densities. The Wassermann test gave a negative result. Studies of the blood and of the urine showed them to be normal. The tuberculin test gave a positive reaction.

A bilateral intranasal antrotomy was performed in June 1930, and there was drainage of pus for several weeks afterward. In January 1931, the nasal discharge reappeared. The nose was found to be filled with polyps, which were removed. The patient's weight fell below normal, and she was sent for six months to the Stanford Convalescent Home, where her sinuses became dry, and where she gained 15 pounds. By October 1931, the sinusitis had returned, and in October 1932, it was again necessary to remove polyps from the nose. During that time physical examinations of the chest revealed no abnormalities. In September

1933, the patient returned to the children's clinic because a productive cough had developed about a month previously. The throat appeared normal. Râles were heard, brought on by coughing, posteriorly at the base of the left lung. A roentgenogram of the chest revealed a corresponding inflammatory process (fig. 2 *B*). The rate of sedimentation of the blood was 28 mm. in thirty minutes. The sputum at that time was scanty in amount.

The injection of iodized poppy-seed oil was not successful until January 1934, when roentgenograms showed definite cylindric dilatation of the lower and posterior bronchi of the lower lobe of the left lung (fig. 2 *C*). The rate of

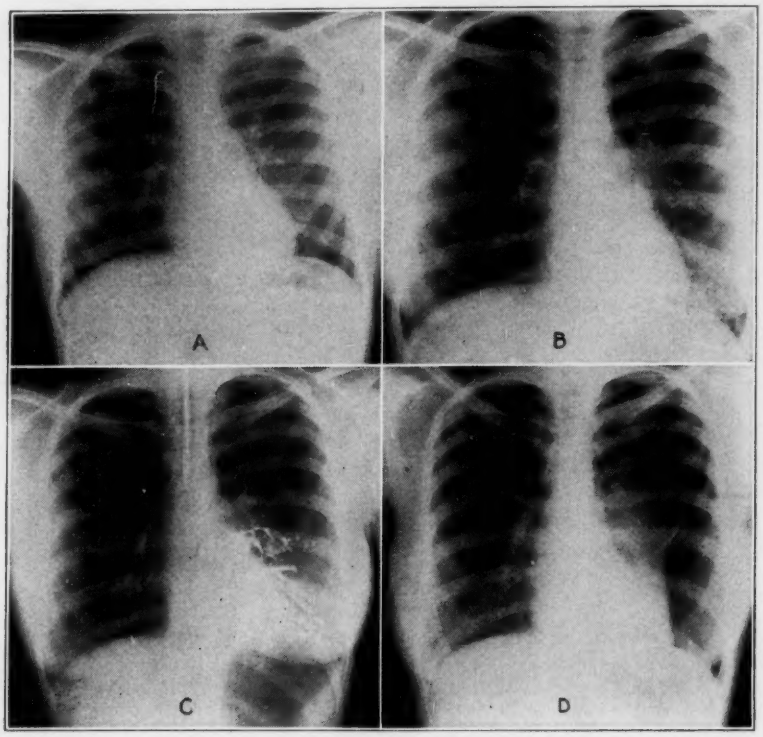

Fig. 2 (case 2).—*A*, moderate hilar markings in the patient (aged 9 years), who at that time showed a postitive reaction to the tuberculin test; *B*, inflammation of the lungs of the patient (aged 13 years), who then had râles at the base of the left lung after coughing; *C*, appearance of the lungs after the injection of iodized poppy-seed oil, four months after the roentgenogram in figure 2 *B* was taken, and *D*, artificial pneumothorax one year after the roentgenogram in figure 2 *C* was taken.

sedimentation of the blood was then 28 mm. in one hour. The cough became productive in July 1934, and seven examinations of the sputum gave no evidence of tuberculosis. Inoculation of a guinea-pig produced a negative reaction. The sputum increased to about 15 cc. and later to 30 cc. daily, when it was three layered but contained many particles like millet seeds. Again numerous small polyps were removed from the nasal passages. The child's condition remained

unchanged. In October 1934, after concentration of the sputum, acid-fast bacilli were found, and since then they have been noted at each of the examinations, which have been made monthly for ten months. Shortly after the acid-fast bacilli first were found, a successful selective pneumothorax was performed (fig. 2 *D*). The sputum gradually diminished in amount.

At the time of writing this, the patient is 16 years of age. Her sputum contains daily about 17 cc. of liquid and 2 cc. of solid material. The rate of sedimentation of the blood has remained unchanged, and the sputum still shows acid-fast bacilli. Her general condition has greatly improved, and her sinusitis seems completely abated.

COMMENT

The features common to the histories of both patients are: first, exposure to tuberculosis during childhood (in one case the mother died from the disease, and in the other exposure was presumptive, as manifested by the positive reaction to the tuberculin test and by the erythema nodosum); second, a diagnosis of the childhood type of tuberculosis at an early age, and third, a history and findings of typical chronic sinusitis, with subsequent development of symptoms and findings of bronchiectasis (proved in each instance by the injection of iodized poppy-seed oil and the taking of roentgenograms). At the approach of adolescence, in each girl there was a lesion of the base of the left lung, with the production of considerable sputum, which was found to contain acid-fast bacilli only after concentration but which usually showed them then.

In a recent review by Hamilton and Fredd,[2] calling attention to the frequency with which tuberculosis may occur in the lower lobes, the authors stated that negative results of examinations of sputum do not rule out tuberculosis of the lower lobes, and expressed the belief that the history and the clinical course are the most important factors in diagnosis.

If bronchiectasis and tuberculosis occur together, the problem of proving the existence of the latter is evidently more difficult than offering proof of the presence of the former. Acid-fast bacilli then occur in sputum considerably diluted by material from bronchiectatic cavities, and finding them offers difficulties similar to those encountered in searching for them in pleural fluid or in fluid from the spinal canal. Yet when insistent search is made in the presence of tuberculous disease in any condition in which fluid material is available from the site of the disease, acid-fast bacilli usually are found.

The recognition of tuberculosis in persons suffering from bronchiectasis is important from a public health standpoint. These persons would of course be potential, if not actual, disseminators of tubercle bacilli, and the hazard would lie in the fact that bronchiectasis, which might predominate in the clinical picture, is not generally considered to

2. Hamilton, C. E., and Fredd, H.: Lower Lobe Tuberculosis: A Review, J. A. M. A. **105**:427-430 (Aug. 10) 1935.

render the patient a danger to society. Obviously, if tuberculosis is present and tubercle bacilli are found in the sputum, these patients should be treated, from the standpoint of public health, as are other persons with open tuberculosis. The recognition of the real state of affairs in the case of children is especially important, because of the freedom with which they intermingle in school and at play.

CONCLUSION

The suggestion may be made that one should not be satisfied with the diagnosis of bronchiectasis by itself, no matter what the findings, in any child who has a definite history of tuberculosis or of tuberculous contact. Basal pulmonic lesions may be proved more easily to be bronchiectatic than tuberculous, but the possibility of the existence of tuberculosis, whether bronchiectasis is present or absent, should not be forgotten.

ERYTHROBLASTOSIS FOETALIS

REPORT OF A CASE IN WHICH THE PATIENT WAS TREATED AND IN WHICH THERE WERE CLINICAL SIGNS OF KERNICTERUS WITHOUT POSTMORTEM CONFIRMATION

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Attention has been directed in recent years to a type of dyscrasia of the blood, erythroblastosis foetalis, which occurs in the newly born. We present a case of the condition accompanied by icterus gravis neonatorum, in which what was thought to be recovery occurred after repeated blood transfusions and was followed by symptoms of degeneration of the central nervous system, which we thought were due to kernicterus. Mental retardation, muscular spasticity and convulsions were prominent, and death came when the child was 13 months old.

Diamond, Blackfan and Baty [1] presented a summary of erythroblastosis foetalis, with a discussion of the pathologic process. Zimmerman and Yannet [2] showed that this condition, with its concomitant jaundice, can produce kernicterus, or jaundice of the nuclear masses of the brain, which may cause the cerebral malfunctions which subsequently show themselves in patients who have had erythroblastosis foetalis. Their second paper [3] definitely proves their first contention by repeated reports of postmortem studies on supposedly cured children who came to autopsy at 3 or 4 years of age. Clifford and Hertig,[4] Arthur Abt [5]

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1. Diamond, L. K.; Blackfan, K. B., and Baty, J. M.: Erythroblastosis Fetalis and Its Association with Universal Edema of Fetus, Icterus Gravis Neonatorum and Anemia of Newborn, J. Pediat. **1**:269, 1932.

2. Zimmerman, H. M., and Yannet, H.: Kernicterus: Jaundice of the Nuclear Masses of the Brain, Am. J. Dis. Child. **45**:740 (April) 1933.

3. Zimmerman, H. M., and Yannet, H.: Cerebral Sequelae of Icterus Gravis Neonatorum and Their Relation to Kernikterus, Am. J. Dis. Child. **49**:418 (Feb.) 1935.

4. Clifford, S. H., and Hertig, A. T.: Erythroblastosis of New-Born, New England J. Med. **207**:105, 1932.

5. Abt, A. F.: Erythroblastosis in Icterus Gravis Neonatorum, J. Pediat. **3**:7, 1933.

and others have presented excellent summaries of this condition in an effort to bring to the attention of obstetricians the clinical manifestations which may be present at or shortly after birth, in the hope that early recognition and treatment will avert unhappy sequelae.

A recapitulation of the diagnostic signs may be of value. A history of neonatal deaths of previous siblings should be looked for. The obstetrician may notice a peculiar golden yellow color of the vernix caseosa. An unusually large placenta should be considered a presumptive sign. Anemia or edema with or without jaundice appearing at birth or within the first twelve to twenty-four hours thereafter should lead one strongly to suspect the condition. Concomitant momentary or prolonged cyanotic spells in which the skin becomes dusky are often seen. Petechial hemorrhages or ecchymoses, enlargement of the liver and spleen and hypertrophy of the heart may be present. The most important confirmatory sign is found in the blood picture. Typically, this shows that the percentage of nucleated erythrocytes is above the normal limit, 5 per cent on the first day being considered a normal level. This is substantiated by a persistent increase in the erythroblast count on subsequent days, with an increase in the degree of the jaundice or edema.

The usual treatment of this condition consists of repeated small transfusions of whole citrated blood.

REPORT OF CASE

A girl, the first born of fraternal twins, was delivered spontaneously after an easy two and a half hour labor. The mother's antepartum period was normal. There was one living child in the family, aged 8 years. There was a history of the death of the second child at the age of 11 days, due, according to the pathologic report, to enlargement of the thymus. The mother's third pregnancy resulted in a stillborn fetus at term; no autopsy was performed. There were two subsequent early spontaneous abortions. At the birth of the patient, neither a golden yellow color of the vernix caseosa or of the amniotic fluid nor enlargement of the placenta was noticed. Apparently the muscular tone, the respiratory response and the general appearance of the child at delivery were normal. Nothing was noted which might call attention to the infant's abnormal condition.

The pediatric intern, in making his usual admission examination, fourteen hours after birth, noted that the child was apparently normal and well formed, except for the presence of mild jaundice, a palpable spleen, occasional regurgitation of watery contents of the stomach and occasional momentary cyanotic spells. These symptoms rapidly became more marked, suggesting a diagnosis of erythroblastosis foetalis. This was confirmed forty-eight hours after birth by the observation of an abnormal number of normoblasts, 6 per cent, in a blood smear containing 1,380,000 erythrocytes. At that time the spleen seemed to be larger and the jaundice deeper, and there was an increased amount of bile-stained vomitus. The temperature rose progressively to 102.4 F. about eighty hours after delivery.

The first blood transfusion, of 50 cc. of citrated blood, was given forty-eight hours after birth. Another transfusion was given seventy-two hours after birth (60 cc.), on the fifth day (30 cc.) and on the thirteenth day (50 cc.). The child

gradually became less anemic, and on the sixth day the blood count showed 3,500,000 erythrocytes, with only 6 per cent normoblasts, an increase of 2,000,000 red cells since the first count, plus a drop in the normoblast level. The erythrocyte count fluctuated between 2,500,000 and 3,500,000 until the child's discharge, twenty-one days after delivery. An intramuscular injection of liver extract was given empirically on the tenth and on the thirteenth day, and injections were continued as outlined in a later paragraph. On the child's discharge the blood count revealed 53 per cent hemoglobin, 3,000,000 erythrocytes and no normoblasts.

Only a few times during the child's stay at the hospital was there any indication of cerebral disturbance. A shrill cry was noted for the first time on the fourth day and was heard occasionally thereafter. However, on the fourteenth day the infant appeared to be listless and to have decreased tonicity of the muscles. The jaundice remained at about the same intensity from the fifth to the sixteenth day following delivery and then began gradually to decrease. The infant lost 13 ounces (368.5 Gm.) from delivery to the sixth day of life, returning to her weight at birth on the twentieth day. Red bone marrow was added to the formula on the sixteenth day.

After discharge from the hospital the patient continued to receive red bone marrow. An intramuscular injection of liver extract was administered on the twenty-fourth, the thirtieth and the thirty-seventh day. The patient continued to show favorable progress; the jaundice decreased and was absent on the thirty-eighth day. At this time the infant showed a marked improvement in her general condition and in her blood picture, so marked that she was considered well.

At the age of 3 months the child had no symptoms or evident sequelae of the disease.

However, when she was 6 months of age a routine examination revealed the development of a spastic condition of the upper extremities and the neck, and she could not control the movements of her head.

At 8½ months the infant had a severe convulsion, and on examination acute pharyngitis was found. The mother said that she had previously noticed occasional twitching of the upper extremities and of the neck. Treatment at this time consisted of the administration of phenobarbital and of a spinal puncture, which revealed normal cerebrospinal fluid. On the third day the infant continued to have twitching, the pharyngitis was still present and the temperature remained high. On the sixth day she seemed to be much improved, and the twitching of her upper extremities had stopped.

When this illness had abated the patient was seen by a neurologic consultant in an attempt to prove the presence of cerebral degeneration. Slight asymmetry of the head plus diminished and slightly spastic movements of the left upper and lower extremities were noted. The child could not sit up or hold up her head alone. The anterior fontanel was open, but the head was not enlarged. There was a Babinski sign on each side. Roentgen examination of the skull gave negative results. No treatment was recommended at this time.

During the first eight months the normal developmental schedule had been markedly delayed. At the age of 10 months the mental condition appeared to be unimproved.

Thirteen months and one day after birth the child was found dead in bed. As a result of an autopsy performed four and a half hours post mortem by Dr. F. D. Gunn, the following anatomic diagnoses were given: lipoid pneumonia, hypoplasia of the heart, an icteric tinge of the aorta—and moderate general lymphoid hyperplasia. There were no signs of abnormal hematopoiesis. The autopsy on the brain, reported by Dr. Arthur Weil, of the neurologic institute of Northwestern Uni-

versity Medical School, eight months later, revealed mild haziness of the pia-arachnoid covering the anterior two thirds of the cerebral convexities, mild edema of the pia-arachnoid covering sections of the frontal lobe and moderate proliferation of fibroblasts in certain areas, with an increase in collagenic connective tissue fibers. In other areas edema was predominant, with a mild increase in small and large mononuclear cells. No polymorphonuclear leukocytes and no micro-organisms were seen. The adjacent cortex was intact except that the blood vessels were markedly engorged. Sections through the striate body and pons showed nothing abnormal, and the pia-arachnoid covering the anterior surface of the pons was not inflamed. The pathologic diagnosis on the brain was acute (nonpurulent) leptomeningitis. Subsequent examinations did not show any evidence of kernicterus, and there were no evident congenital abnormalities which might have been the cause of the mental deficiency.

COMMENT

Since the clinical picture seemed clearly to justify the diagnosis of erythroblastosis foetalis, we record this case as of interest because of our inability to find evidence of kernicterus at autopsy in spite of clinical signs which would ordinarily justify that diagnosis.

HYPOPLASIA OF THE MANDIBLE (MICROGNATHY) WITH CLEFT PALATE

TREATMENT IN EARLY INFANCY BY SKELETAL TRACTION

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A careful search of the literature [1] failed to reveal a case in which skeletal traction had been used in the treatment and the correction of micrognathy with cleft palate, and because of the successful result in this case, it is perhaps worthy of report. As marked dyspnea, difficulty in swallowing and inability to nurse were all present, I was unable to accomplish anything with the lip-guard nipple apparatus suggested by Dunn and Davis,[1c] nor was I able to keep the mandible forward sufficiently to relieve the symptoms by bringing a brace up behind the mandibles, as suggested by Eley and Farber.[1d]

REPORT OF A CASE

Baby C, a girl aged 3 days, was brought about 200 miles (3.2 kilometers), from Idaho, to Dr. Wilkie Blood, a pediatrician of Salt Lake City, for relief of dyspnea and cyanosis. The history consisted of one salient fact, that since the infant's birth, three days before, some one had been forced to hold her constantly in the ventral position. The moment she was placed on her back, respirations stopped and she became cyanotic. When she was placed well over on her side, breathing was difficult and cyanosis persisted. The respiration was unobstructed only when she lay in a ventral position with her face directed downward.

On examination, the infant was found to be dehydrated and to weigh 5 pounds and 11 ounces (2,680 Gm.). She had marked hypoplasia of the mandible with cleft palate. The tongue was displaced so far posteriorly that when the

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1. (*a*) Blair, V. P.: Underdeveloped Lower Jaw, with Limited Excursion: Report of Two Cases with Operation, J. A. M. A. **53**:178-183 (July 17) 1909. (*b*) Coughlin, W. T.: A New Treatment for Underdeveloped Jaw, ibid. **84**:419-421 (Feb. 7) 1925. (*c*) Davis, A. D., and Dunn, R.: Micrognathia: A Suggested Treatment for Correction in Early Infancy, Am. J. Dis. Child. **45**:799-806 (April) 1933. (*d*) Eley, R. C., and Farber, S.: Hypoplasia of the Mandible (Micrognathy) as a Cause of Cyanotic Attacks in the Newly Born Infant: Report of Four Cases, ibid. **39**:1167-1175 (June) 1930. (*e*) Ivy, R. H., and Curtis, L.: Some Orthopedic Problems of the Lower Jaw with Special Reference to Unilateral Shortening, J. Bone & Joint Surg. **10**:645-660, 1928.

infant was placed on her back the tongue dropped back, completely blocking respiration. If one grasped the symphysis of the rami of the mandible with the thumb and finger and exerted traction forward, the baby was able to breathe well while lying on her back, and this determined my later treatment.

The infant was feeble and unable to nurse, so for ten days she was watched continuously, kept in the prone position, fed with a tube and given fluids under

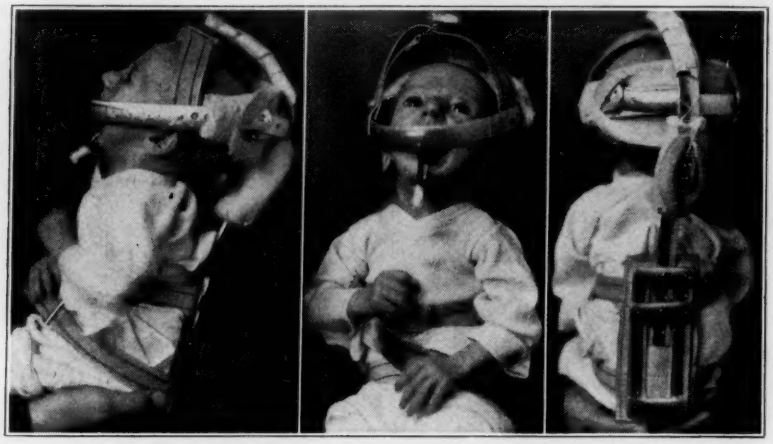

Fig. 1.—Photographs showing the apparatus used.

Fig. 2.—Photographs showing the improvement in the baby's appearance. *A* was taken before treatment and *B* after treatment.

the skin. I was unable to keep the mandible forward by the method suggested by Eley and Farber,[1d] so I determined to attempt skeletal traction on the junction of the mandibular rami.

A simple apparatus, as shown in figure 1, was devised, which had as its basis a jury-mast similar to that used in cases of fractured cervical vertebrae. A large flat ring was attached to the mast and was brought around in front of the baby's mouth; numerous holes were punched through this aluminum band. A thick silver wire was passed through the skin and around the mandible, holding it forward when traction was applied and yet permitting a swivel motion like a clevis bolt

on a doubletree. A small spiral spring was attached to this loop of silver wire and to the fixed flat band by a loop of wire. I was able to regulate the pull by the tension on the spiral spring. The baby, lying on her back in the frame, furnished the counter traction. The child was perfectly comfortable lying in this apparatus and was able to move her head somewhat from side to side without pain. The traction kept the mandible well forward, and the child breathed without embarrassment. Feeding was at first done with a syringe and a small tube in the mouth, but after a few days a nurse discovered that she could place a nipple with large holes at an angle in the mouth and that the baby would nurse.

We could see marked development in the mandibles from week to week. After the apparatus had been on for about four weeks I disconnected the spring and took the frame off to clean it and discovered that the infant did not need it any longer. She breathed without any difficulty while lying on her back.

The baby was discharged a week later with all the traction apparatus removed, in excellent condition and weighing 8½ pounds (3,855 Gm.). There was a marked change in her profile, as shown in figure 2.

COMMENT

Davis and Dunn [1c] and Eley and Farber [1d] covered the literature thoroughly in a discussion as to the embryologic cause of micrognathy. Since dyspnea and inability to swallow seem to be characteristic in this condition and may be so severe as to threaten life, I suggest this simple treatment for the child in whom the condition is severe and does not respond to other suggested treatment.

Progress in Pediatrics

MEETING THE NEEDS OF THE COMMUNITY

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The organization in San Francisco of a child hygiene committee of the health council of the community chest has provided an opportunity for the study of the health facilities of a number of agencies dealing with children.

For the sake of clarity, the handicapped groups have been divided into three subdivisions: (1) the physically handicapped, such as the

Classification of Handicapped Children for Medical Supervision

Physical	Mental	Social
Convalescents	Children with mental deficiency	Orphans and semiorphans
Children with subacute or chronic disease (tuberculosis, cardiac disturbance, etc.)	Feebleminded children	Indigent children
	Backward children	Foreigners
	Delinquents	
Crippled children	Problem children	
Deaf children		
Blind children		
Children with speech defects		

sick, crippled, blind or deaf; (2) the mentally handicapped, such as the feebleminded or delinquent, and (3) the socially handicapped, such as orphans and abandoned children (table).

Over ninety agencies are members of the chest, and about one third of these deal with children. These agencies include orphanages, nurseries, homes for transients, homes for delinquents, convalescent homes, foster homes and the "mother's aid" group. The object of the committee was to develop an adequate health service for all dependent children. As preliminary work we studied available statistics that had been gathered by other committees of the chest or by outside agencies. We asked the department of health to define its responsibilities and duties in the health supervision of dependent children, and we asked the doctors in attendance on these children to

From the Children's Hospital.

give a concise summary of what was being done and what, in their opinion, ought to be done to develop an adequate health service. Medical standards covering the physical care of children of each of the aforementioned types were then compiled. These regulations covered in considerable detail such points as admission requirements, routine and follow-up examinations, laboratory work, immunizations, correction of defects, examination of adult personnel and medical supervision. The standards were approved by the community chest and accepted by the department of health and the agencies. At the request of the institutions, a dietary survey under the supervision of Miss Charlotte Sloan was made of ten homes, three convalescent homes and the day nurseries. It covered such items as the amount of food purchased, the waste on plates and the distribution between staff and children. The amount of protein, carbohydrate, mineral and vitamins provided per child per day was analyzed. The dietaries were on the whole adequate. A number of suggestions were made and were apparently well received. It was interesting that the ten institutions reported unanimously: "Nothing comes back on the plate." There were no hunger strikers in these groups.

After the dietary survey, studies on height, width and weight were made on the children of seven institutions in the age groups from 6 to 16 years. The study of these children was particularly interesting because we had for comparison the figures by Lucas and Pryor [1] for a group from private practice and by Geiger and Barrett [2] for children on food relief. The weight curves were plotted for each institution separately as well as for the entire number examined, about 1,000. The curves compared favorably with those of the other two groups; the majority were about 10 per cent above the midline of the curves for the other groups, and there were fewer underweight and more overweight children than in either of the other groups. All the curves, however, were similar.

At the time of these measurements hemoglobin readings were made by Miss Alois Mason. She used the Sahli method and the same apparatus that she had used for a group of patients in a private office. The average percentage for all the children was 81.9, and that for the group from private practice, 84.4. The lowest average for separate institutions was 75.5 per cent and the highest 93.1 per cent, a difference of 17.6 points. This was at least partly explained by the fact that the children in the institution with the highest average had had some reenforcement with iron and the children in that with the lowest average had just passed through an epidemic of scarlet fever. The

1. Lucas, W. P., and Pryor, H. B.: J. Pediat. **6**:533 (April) 1935.
2. Geiger, J. C., and Barrett, P. S.: Am. J. Pub. Health **25**:183, 1935.

latter group was rechecked six months later, after vacationing in the country, and the average then was 82.6 per cent.

A special examination was made by Dr. Helen Pryor of the children found to be markedly above or below average weight. Most of the children reexamined had some obvious cause for not conforming. Some were of another race; some had grown extremely rapidly for a year, and the weight had not kept pace with the height; a few had endocrinopathy, and some overindulged.

A dental survey was made by Dr. Charlotte Greenhood at the same time these studies were being conducted.

Although these studies in San Francisco were made under the auspices of the community chest, different organizations in other communities may be the more logical ones to conduct them. It is conceivable that the county medical society or the department of health alone or in cooperation with the social security personnel might do the work. Individuals or lay organizations at times or in certain communities may be the only instrumentality available to do much of the work or may be the one most cognizant of the need, but health is so intimately tied up with any movement of child welfare that to be successful a program must be under the guidance of members of the medical profession.

Although these studies yielded some interesting findings, their real value lay in the opportunity they gave the members of the committee to get acquainted with the needs of the community, and it is with the larger problem, adequate care for all the handicapped children, that this paper is particularly concerned.

The first step in an intelligent approach to the study of community needs is a determination of the number of needy persons and the type of care indicated. There are no official statistics on most of the handicaps, as there are, for instance, on communicable diseases. Other methods of estimating the needs of handicapped persons must therefore be used at present.

Impressions and propaganda are unreliable. Certain handicaps, such as crippling from poliomyelitis, have a great emotional appeal, and the actual needs may be exaggerted. Frequently, an enthusiastic philanthropist obtains large endowments for expenditure in a field in which he is interested, when the needs in another field may be much greater.

In the last several years the figures from the White House conference reports have been used as a yardstick for measuring the number of handicapped persons in certain communities. Although these figures are interesting for general use and for comparisons, they cannot be relied on for application to any given community. Variations due to climate, type of population, industries, economics and a great many other factors are too great to permit any standardization of figures.

Some form of census might be taken, the most reliable of which would probably be a house to house canvas. Although this might be practical in smaller communities, it would hardly be feasible in the large cities. Here a study of the clinics, agencies, various school and department of health records, with a proper evaluation of the results, will give a fairly accurate picture. Private physicians will usually cooperate in such a study.

In obtaining these figures, one must appreciate that one is dealing not with fixed invariable problems but with constantly changing ones. Figures obtained one year may not apply to the next. The health problems of today are different from those of fifteen or twenty years ago, and the next decade may show even greater changes. Tuberculosis of the bones, for instance, has almost ceased to be a problem, and rachitic deformity is almost as rare. Blindness has decreased. On the other hand, after an epidemic of poliomyelitis the number of cripples may suddenly increase, and for still unexplained reasons rheumatic carditis seems to come in almost epidemic waves. Therefore, the statistical study of the needs should be by a method which yields reliable figures and also offers a means of rechecking these from time to time. The question of making certain types of defects reportable is under consideration.

Even with a great deal of information as to numbers, it is hazardous to invest in institutions of various types without a concrete knowledge of the actual use that will be made of the facilities when they have been provided. For this reason it is well to start modestly or, whenever possible, to arrange for a trial home for a given period in order that one may not construct expensive buildings and later have no occupants for them. It is difficult, for instance, to determine the number of beds needed in a community for its adolescent cardiac patients. Some of the patients may require care for three months and others for two or three years. However, an existing institution might be asked to set aside a few beds for six months or a year to meet the need temporarily and see how extensive it actually is. It obviously would not be economical or practical to build a special home to care for adolescent cardiac patients if only four or five beds were required to meet the demands. Some provision should be made for them, but in order to reduce overhead, accommodations should be provided in an existing institution the organization and personnel of which can absorb the care of a few more persons without materially increasing expenditure. In studying any other needs the same rules should apply; certain existing institutions should have a ward or wards that are elastic enough to care for special problems as they arise and yet can be closed without jeopardizing the institution when the problems no longer exist.

In addition to determining the needs of a community, the committee should study the existing agencies. In most communities, at least in

the urban ones, a varying number of facilities for the care of handicapped persons are functioning. In connection with the study of the number and kind of handicaps, the extent to which existing agencies meet the need should be surveyed. Again it is well to group these agencies according to the type of handicap, physical, mental or social, in order that the needs and the supply can be more readily correlated. The number of social agencies found in or serving a community depends somewhat on the size, age, economy and social interests of that community. At present, state, county, city and private agencies are functioning.

It would be an advantage to have clearly defined the type of agency best suited to care for a particular need. The crippled child, for example, needs highly specialized care over a long period. Facilities for surgical treatment, swimming and rehabilitation are necessary. These are expensive, and the number of cripples is relatively small. It would be advisable, therefore, to concentrate this work in the larger centers, and the state seems to be the logical unit for developing the work. The same principle applies to the deaf and the blind. It would be uneconomical and inefficient to handle these children in small units. On the other hand, the number of tuberculous patients at present usually means that each county needs a sanatorium or, where population is sparse, that several counties should unite in the work. Convalescent care of short duration is best provided for by local communities. A great deal of duplication and confusion would be avoided if the work were thus analyzed and developed, always from a long time point of view, which would take into consideration the possibilities of changing conditions, so that adjustments might be provided for.

Private agencies dealing with children need to be further studied and their endowments, equipment and function to be better fitted into a larger scheme providing for the adequate care of all children. An attempt will be made in the next few paragraphs to elucidate some of the difficulties encountered in making such a study.

These agencies were originally started and conducted by private or religious groups conscious of the needs of less fortunate members of the community. As social consciousness developed, more and more of the work was taken over officially by the government. The department of state institutions has long cared for the insane, the feebleminded and similar defectives. The board of health controls many of the general health measures, and more recently adoption laws and mothers' pensions have aided orphans and needy mothers. With one type of work after another taken over by federal, state or county boards and financed by taxation, it has become increasingly difficult for the private agency to define its function and even more difficult to finance it. A certain amount of money has been invested, and the trustees of the

funds, as well as others intimately interested, desire to get returns from the investment. Many institutions are top-heavy with endowments. Large bequests have been made for buildings and elaborate equipment, and nothing has been left with which to operate. Other bequests are so stated that it is difficult or impossible to change the work to meet altered conditions. Enormous funds have been tied up indefinitely and uselessly owing to the form of the bequest; there is a fund to help covered wagon caravans across the plains that cannot be directed to any other use even though the original need has long since ceased to exist. Instances like this can be multiplied almost indefinitely. A little education in regard to the endowing or financing of institutions would not be amiss.

Other difficulties arise because the private agencies are not always independent but may be part of a large and often national or international religious or social institution in which the financial organization is intricate and the balancing of its own budget, as it were, may at times require a distribution of funds away from the community in which they are received. Then too, institutions are usually placed in the larger cities, which means that several similar ones belonging to different private groups may be located in one area, and this situation may easily lead to a duplication of work, since each agency needs much the same type of organization and personnel and may not always serve the maximum number of persons. Furthermore, in a few instances only, the endowment covers the expense of operation and the institution remains independent; in the vast majority of cases the operating cost is dependent on annual donations, payments from patients and community funds. At all times, but particularly in times of depression, it is difficult to raise the money and the operating cost must therefore be kept at a minimum. One way of keeping per capita cost down is to keep the institution full. This, in turn, has its undesirable effects. Admission requirements may be made too lenient, the part pay patient is at a premium and children who can be cared for elsewhere more cheaply and sometimes better for their particular needs may be admitted. Nor is keeping all beds occupied the only means of reducing overhead; it may be done by asking for volunteer services or transferring work to another agency, which will be credited with the cost. Medical services are naturally the easiest to get without paying. Most charitable institutions were started by lay people, and a physican was asked to give volunteer services when children were sick. The marked improvement in the care of institutionalized children has not always been paralleled by similar improvement in medical supervision. This is partly because doctors continue to give volunteer services in places where properly remunerated services should replace them. The institution's personnel hesitate to ask services of a doctor when he is not paid, and the doctor hesitates to step in and organize a health program when he does not

feel that he is an essential part of the institution. Consequently, the work is inadequately done. At present the best health services are found in institutions where a doctor is paid a reasonable fee, for which he gives the routine services, such as admission and routine examinations, immunizations and sick calls. Consultations and special examinations, such as roentgen examinations and metabolism tests, are referred to a clinic, and the hospital provides beds when illness requires it. In the medical standards for orphanages in San Francisco it is recommended that a doctor receive a minimum fee of $50 a month from institutions with from seventy-five to one hundred children.

Connection with a hospital solves the cost of medical care only by shifting the greater burden to another agency, namely, the hospital's free beds or its clinic. These services are free only to the patient; some one pays for them, an endowment, a community chest or the private patients who enter the hospital, often paying high prices. In an attempt to determine a fair estimate of the cost of medical care, a study of the incidence of illness in children in institutions is being made. This will have to be done over a period of years to be accurate, owing chiefly to the variability of contagious diseases. It is hoped that part of the statistics may be obtained for past years in order that an estimate can be made earlier than would otherwise be possible.

There is no reason why the cost of caring for different types of handicapped children cannot be definitely determined and analyzed. The percentage devoted to food, clothing, supervision and medical services should be known. The operating cost divided by the number of days' care given will give the cost per day per child. Obviously, the costs vary with the type of institution. The most cheaply run institutions being studied are the summer camps. Next are the country convalescent homes for ambulatory patients. In the latter the cost may be as little as $1.39 per day per child. Expenses in convalescent homes giving bed care range from $2.31 to over $3 per day per child. The orphan homes cost from 65 cents to $2 per day per child. The lower price is in the Catholic homes where sisters of charity do a great deal of the work. Smaller homes may cost from $3 to $4. The expenses of care in sanatoriums and the care of crippled children approach or equal those of hospitalization. These figures are for operating costs only and do not take into consideration the original investment.

Many institutions serving the poorer classes, as these agencies do, charge the patient a small fee if they can get it. It usually amounts to $20 or $25 a month. As the foregoing figures reveal, this does not cover the cost. Yet parents often believe that they are paying for the care of the child and are not receiving charity. Superficially there is no objection to this system. The purpose of these institutions is to help persons in need, and the endowment or the community funds are

obtained for the purpose of making up the difference. Actually, however, the method is not without its ill effects. The chief of these is that it sets the price for such care at the figure charged the patient (from $20 to $25 a month). Just as a reduction in medical fees for one set of patients reduces them for all, so private patients who can afford to pay for convalescent or other institutional care feel that fees in private institutions are exorbitant when compared with those in charitable institutions. The system makes it practically impossible for unendowed institutions to exist. People will not pay the price necessary to make such an institution self-supporting. For a working person, $50 or $60 a month for room and board is considered reasonable, but the same price for convalescent care is practically impossible to get.

A little mathematics will show the absurdity of expecting adequate convalescent care for the prices quoted. In San Francisco nonfire-proof homes are limited to six patients. At $50 a month this makes an income of $300. Out of this must come rent or its equivalent, light, heat, gas, food and the salary of a cook and of at least one part time attendant; the nurse, who usually heads the venture, takes what is left.

A more logical procedure would be to set the price of care at the actual cost and let patients unable to meet it apply for aid. A careful social service study of the case would then reveal to what extent the applicant should be helped. This procedure might tend to decrease abuse and would set the price of care at a figure nearer its worth and thus do away with competition.

The religious organizations that pioneered in works of charity and have developed them to a high degree of efficiency and usefulness have a right to continue. There is a devotion in their work that may be lost if institutions become too mechanically efficient. A little competition, too, is not undesirable, and with a broader concept of the entire problem of aid for handicapped children, their usefulness should be enhanced. It might mean a change of function of some or even a disbanding of a few of the agencies.

A few observations that have been made may be interesting and useful. Certain trends in social service bear critical watching. Both medical men and social workers at times become so intrigued with the structure they are building that they forget or overlook possible consequences. The goal in medicine has been to eradicate disease; the goal in social work should be to eliminate the need of social service. Instead, the aim at times seems to be indefinite expansion and assumption of increased care of its clientele. Training changes public attitudes; parents who at first accept the care reluctantly gradually learn to expect it, and finally they abuse it. It may be unwise to help too much and too generously. The study of the psychology of the recipients of relief has been neglected. Certain responsibilities belong to parents and should

be placed there; a back to the home movement in social service would not be amiss. For instance, it may be simpler for doctors and nurses to hospitalize a child through an acute illness and let him recuperate in a convalescent home, but it may be better for the mother and, in the long run, for the child to train the mother to care for him at home. From four to six home calls by a nurse after an acute illness should suffice for a month's convalescence. The cost would be relatively slight, the child would be spared several adjustments and readjustments and the mother would profit immeasurably by the training, not only for the present emergency but for future problems that are certain to arise in any home with children. The satisfaction that a mother derives from knowing that she has helped her child and the pride in the knowledge of her training are worthier accomplishments than the mere care of the child by an outside agency.

There are means of meeting the problem of the working mother or the divorced mother and her child without placing the child in an orphan home. The "collective home" of Stockholm, Sweden, like the apartment houses of the United States, has small apartments, but it has also a central cafeteria and a central nursery school with a competent nursing supervisor in charge. The small kitchenette of the apartment provides opportunity for private meals when they are possible. It is cheaper for several mothers to help pay for a cook and a nurse to do joint work for them than it is for each one to attempt to do it alone.

It will be found in most communities that facilities with which to meet physical handicaps are far better than those for the alleviation of mental or social handicaps. Again, the private agencies are trying to meet this problem. As stated previously, a high percentage of the children in so-called orphan homes have living parents. It is apparent when one visits these homes that the problems with such children are different from those with real orphans. The question is largely one of mental hygiene. One or both parents visit the child from time to time, and family strifes are conveyed to the child. He is taken away from the institution for week-ends and vacations, and the influence he feels then is often entirely contrary to the training in the institution. The parents may reunite and the child go back to his home; or one or both parents may remarry, and he is tossed back and forth, the innocent and helpless victim of jealousies, strifes and hatreds. One child of fourteen has been in forty different homes. No matter how excellent a mental hygiene program the institution develops, short exposures of children to it can hardly be expected to counteract all other influences at play on a sensitive young mind. Some of the institutions, therefore, have changed their policy from that of a home to that of a private boarding school. No attempt is made to replace the home as is done by adoptions, foster

homes or the cottage plan of orphanages. This is unquestionably a departure of significance. A true school spirit, together with the discipline and training that the institution offers, is probably the best one can give a child as a substitute for the security and love of a good home. However, it does not replace such a home.

A satisfactory program for the long time care of physically, mentally or socially handicapped persons must be based on accurate statistics of the numbers needing the care. These must be obtained by a method more satisfactory than surveys. Certain physical and mental handicaps should be made reportable. Tuberculosis already is; the heart association, by its own methods, keeps case reports; it has been suggested that when poliomyelitis is reported the amount of crippling should be noted. It should be relatively simple, therefore, to make these and other handicaps, such as blindness, total deafness and feeblemindedness, reportable. Not only do properly evaluated statistics give the numbers that must be dealt with, but the study of changing trends of various types and similar topics is a great incentive for the institution of preventive work.

The socially handicapped, orphaned or abandoned who need help should apply for aid at a central bureau, their needs should be investigated by competent social workers and they should be correctly placed, with support from the proper source, whether this is a pension, adoption or another agency. Such a bureau would have statistics on types of handicapped persons which could be used in following trends and instituting preventive work.

The proper care of mentally and emotionally handicapped persons is the least well developed. Persons with certain types of mental deficiency need permanent housing with adequate care. This problem should be relatively simple to solve. Persons with major adjustment problems, such as one finds in juvenile courts, require another type of program. And psychiatry, even though a relatively new science, is being turned to preventive work because of the discouragement of its practitioners with the handling of established delinquents. Little systematic work in prevention has been done. Aldrich and Veeder [3] recently outlined the relation of the pediatrician to mental hygiene. This is the field in which one can hope for the greatest success. Studies in it might profitably parallel those of the physical care of babies. Although some babies survived and became healthy adults before the supervision of infants was instituted, it has been demonstrated beyond doubt that infant mortality has been decreased and the general health of children improved by such care. Similarly, it is logical to believe that the proper handling of the mental and emotional development of children will lead to the

3. Aldrich, C. A., and Veeder, Borden S.: J. Pediat. **9**:323 (Sept.) 1936.

better adjustment of adults. The technic for such care should be worked out through the combined studies of physicians, psychiatrists and educators, just as the problems of infant feeding were studied by experts; but when the technics have been evolved, they should be applied by the persons reaching the largest number of babies. In San Francisco practically 100 per cent of the babies are under the supervision of private physicians or of health centers during their first year. The feeding services and well baby centers are the proper places for the introduction of preventive measures. It should be borne in mind that such instruction requires better trained physicians than many practicing pediatricians today and that it takes a longer time to give such instruction than is allowed in most well baby centers.

Education must not be limited to the care of the baby; the parents are an integral part of his development. As was pointed out earlier, one of the greatest problems of orphan homes at present is the proper care of the children from broken homes. Most of the infants at the health centers are still in their own homes. These homes break a little later. The parents are usually young and should still be teachable. It is possible that many homes could be saved. Young parents are often frustrated by the responsibilities thrust on them with the advent of children. They have frequently not been prepared to meet situations that arise in the establishment of a home. There should be a coordination of the social and religious agencies interested in home making, adult education, sex instruction and family relations.

The object when this study was started was the development of adequate health services for dependent children, but the pursuit of the work has made it apparent that study of the causes and the prevention of dependency is equally important. The pediatrician has a definite responsibility in this work.

384 Post Street.

News and Comment

GENERAL

Correction.—Dr. Saul Schlegman, whose name appeared in the list of physicians certified by the American Board of Pediatrics in the March issue, wishes his address corrected to White Plains, N. Y., instead of White Plains, Ill.

International Hospital Congress.—The Fifth International Hospital Congress will be held at Paris, July 5 to 11.

DEATHS

Dr. Olimpio Cozzolino, professor of pediatrics at the University of Bari, died Jan. 22, 1937, after a lingering illness. Dr. Cozzolino was an outstanding Italian pediatrician, and his loss will be keenly felt. He founded the journal *Il Lattante,* which has rapidly taken its place among the leading Italian pediatric journals.

Abstracts from Current Literature

Biochemistry; Bacteriology, and Pathology

PRODUCTION OF IMMUNITY IN THE RABBIT BY INSTILLATIONS OF STAPHYLOCOCCIC TOXIN IN THE CONJUNCTIVAL SAC; NATURE OF IMMUNITY. G. RAMON, P. NÉLIS and R. RICHOU, Compt. rend. Soc. de biol. **118**:728, 1935.

Three drops of staphylococcic filtrate instilled in a rabbit's eyes produced in seven hours slight inflammation, which progressed to lacrimation and discharge of mucopurulent exudate in twenty-four hours. The disturbance had entirely disappeared in from three to four days.

At intervals of from three to four days staphylococcic toxin was placed in the right eyes of rabbits. Following their recovery from the conjunctivitis, their left eyes were so treated. Very little reaction occurred. Titration of the antitoxin in the blood at this point showed neutralization of 0.04 unit of toxin by 0.04 cc. of serum.

Intracutaneous tests with dilutions of the toxin verified the immunization effect.

WAHL, Cleveland.

INTRADERMAL REACTION TO STAPHYLOCOCCIC TOXIN IN MAN. R. DEBRÉ, H. BONNET, S. THIEFFRY and C. SABETAY, Compt. rend. Soc. de biol. **119**:792, 1935.

Toxin of the hemolytic staphylococcus, 0.1 cc. of a 1:10,000 dilution, was injected intradermally into 102 adults, 50 children and 12 infants; 38 adults, 29 children and 9 infants showed positive reactions. The positive reactions reached their maximum of erythema and edema in forty-eight hours and were followed by slight scaling in three days.

The blood serums were titrated against known units of the toxin of the hemolytic staphylococcus. It was found that the negative tests showed from 0.9 units of antitoxin, while the positive tests individually showed less than 0.5 unit.

WAHL, Cleveland.

TOTAL CHOLESTEROL AND ITS FRACTIONS IN THE BLOOD AFTER HEPATECTOMY. M. FRANKE and S. MALCYNSKI, Compt. rend. Soc. de biol. **119**:1212, 1935.

Determinations were made of total and of free cholesterol and of cholesterol ester in the blood of dogs; the livers were removed, and redeterminations were made at intervals of from fifteen to thirty minutes until death, which occurred in a few hours. Both the cholesterol components and the total cholesterol in the blood showed definite depreciation, owing to the fact that synthesis was obliterated.

WAHL, Cleveland.

RESORPTION OF SUBSTANCES THROUGH SKIN AND MUCOUS MEMBRANE: RESULTS OF IMMUNIZATION BY INHALATION OF VACCINE. S. MATSUMOTO, Acta dermat. **25**:94 (June) 1935.

The author investigated immunization by inhalation of typhoid vaccine. Rabbits into which 1 mg. of typhoid vaccine was introduced by daily insufflation for five successive days became distinctly immunized. This was proved by the agglutination and complement fixation reactions. There were no by-effects even when 50 mg. of vaccine was administered.

Similar investigations were carried out on human beings. The method consisted in frequent insufflations of 1 cc. of vaccine into the mouth or nose. The author believes this to be a simple and ideal method of immunization, which produces high immunity with a much smaller dosage than that used in percutaneous immun-

ization. The mucous membranes act as a barrier against invasion by substances contained in the vaccine and ward off disagreeable by-effects.

BLOOM, New York. [ARCH. DERMAT. & SYPH.]

EXPERIMENTS ON THE PRINCIPLE IN GASTRIC JUICE ACTIVE AGAINST PERNICIOUS ANEMIA. A. W. C. G. KAMERLING and W. GROTEPASS, Nederl. tijdschr. v. geneesk. **80**:1991 (May 9) 1936.

In accordance with the results of the experiments of Reimann (1931), Kamerling and Grotepass found that the effect of liver against pernicious anemia becomes greater after the liver has been incubated with normal gastric juice, while the gastric juice of a patient suffering from pernicious anemia does not show this property. Pepsin and hydrochloric acid did not increase the activity of the liver. After removal of the ferments of gastric juice and ultrafiltration, the ultrafiltrate of the gastric juice even after heating for thirty minutes at 80 C. still showed the same effect on the liver.

VAN CREVELD, Amsterdam, Netherlands.

Metabolism; Infant Feeding; Milk and Other Foods

BREAST FEEDING. C. GRULEE, Illinois M. J. **70**:257 (Sept.) 1936.

This article contains the introductory remarks of the chairman of the round table discussion on breast feeding held in the pediatric section of the Illinois Medical Society at the annual meeting in Springfield on May 19, 1936.

Grulee began by asserting that one of the most abused matters in medicine today is breast feeding, abused by not being insisted on. After showing slides of the statistical charts demonstrating the excellent work performed by him and his associates in emphasizing the importance of breast feeding and the benefits gained from their successful efforts, he pointed out that his charts show rather conclusively that breast feeding does have an effect on the mortality of infants, in the first place, and, in the second place, that it is not merely the physical nutrition of the child that is important but also the protection afforded against infection.

Objection has been raised to the results by some, who say that these results represent a survey of a poorer class of people and could not be duplicated in the other walks of life, but Grulee calls attention to the fact that the death rate for this group is just about one fourth of that for the whole of Chicago. The deaths instead of being about 45 are 11 per thousand. He points out that breast feeding protects children against infections in general.

BARBOUR, Peoria, Ill.

BREAST FEEDING IN RELATION TO SUPPLEMENTARY FEEDING IN THE NEW-BORN. H. G. PONCHER, Illinois M. J. **70**:258 (Sept.) 1936.

This presentation was part of the round table discussion in the pediatric section of the Illinois Medical Society at the annual meeting in Springfield on May 19, 1936.

Poncher quoted Dr. Oliver Wendell Holmes, "A pair of substantial mammary glands have the advantage over the two hemispheres of the most learned professor's brain in the art of compounding a nutritive fluid for infants," and then Dr. Abraham Jacobi, "In the absence of an adequately secreting pair of breasts the most important ingredient in the infant's formula is the physician's brains." He then pointed out that all methods of artificial feeding of infants are successful when certain basic principles are fulfilled. These basic principles are: 1. The formula should be adapted to the digestive tract of the infant at his particular stage of development. 2. It should contain adequate proteins, fat, carbohydrate, minerals, water and vitamins. 3. It should be calorically sufficient and be fed in amounts and at intervals suitable to the individual needs of each infant. 4. It should be bacteriologically safe and chemically clean. Successful infant feeding, therefore, is a matter of the judicious application of feeding principles and not of the supremacy of any one formula.

The new-born infant may present a special feeding problem when the secretion of breast milk is retarded or when nursing vigor is diminished. Boiled water is one of the first articles added to the diet. While Poncher readily admits the necessity of preventing dehydration and its sequelae, he states that no one has yet presented unequivocal evidence that an excess of fluid in the tissues is any advantage to the new-born infant. Yet recent investigations have shown that many of the hydrating solutions advised for such infants produce that specific condition.

Some carbohydrate seems to be desirable after the first twenty-four hours in the period immediately after birth. The choice of the carbohydrate used in the mixture seems to make very little difference, except that sweet sugars tend to take away some of the zest for breast feeding. The concentration of sodium chloride or citrate in the mixture will determine whether the hydration of tissue will be expressed clinically as generalized edema or as a superior gain in weight. Some prefer a hydrating salt in addition to water and sugar; attention might be called to the fact that they have an excellent source for this in colostrum.

Any method, then, of prelacteal feeding is desirable that prevents dehydration and hypoglycemia when the conditions for their development are present and that does not send the infant to the breast with the feeling that the latter is in marked contrast to the bottle, from which the flow of nutrient is obtained so easily. Many babies have been unnecessarily weaned from the breast because of the injudicious use of the prelacteal feeding. If one admits the truth that breast milk is the most desirable nutrient for new-born babies, then one's chief aim should be to conserve the maternal milk supply. Since one's best galactagogue is a vigorously nursing infant, any measure that defeats this nursing vigor is an unconscious gesture at weaning.

BARBOUR, Peoria, Ill.

BREAST FEEDING FROM THE STANDPOINT OF PRACTICE. G. M. CLINE, Illinois M. J. **70**:261 (Sept.) 1936.

This presentation was part of the round table discussion in the pediatric section of the Illinois Medical Society at its annual meeting in Springfield on May 19, 1936.

During the last ten years, on two different occasions, the McClean County Medical Society has sponsored instruction of professional and lay educational groups in the advantages and technic of breast feeding. The results of these efforts have been discouraging. The idea, Cline agrees, is right, but so often during the busy hours of the day it seems easier to prescribe a formula than to spend time with the mother in an educational program for her, and therefore physicians do not practice what they preach.

Breast feeding is an old, old story, and today, Cline points out, with the newer methods of artificial feeding, nothing has taken its place completely. In carrying on an educational program for mothers, certainly the medical profession should be included. Particularly at the doorstep of the general practitioner and the obstetrician, the program should begin. When the pregnant mother presents herself to the physician for examination, the breast feeding story certainly should be told: 1. Breast feeding is the natural way. 2. From the standpoint of the baby, it is the safer way. 3. From the standpoint of the mother, it is the easier way. Stimulation of breast and nipple should be practiced for several weeks previous to her delivery.

After birth the burden rests with the physician or the pediatrician and certainly not with the nurses or the head nurse of the obstetric department. Very much of the success or failure of breast feeding depends on the program carried out in the hospital. Another important period is that from the second to the fourth week of life, or the time when the mother returns home with her offspring. At this period she needs her doctor's intelligent support. As time goes on, she will still need his help. Kind and prompt attention to her questions as well as planned future programs for her to follow make for a larger successful practice, a healthier child and a happier home. The pendulum has swung too far away from the safe and natural way, and physicians are solely responsible for its return.

BARBOUR, Peoria, Ill.

DRY MILK FEVER IN AN INFANT FOUR MONTHS OLD: RÔLE OF INSUFFICIENT INTAKE OF WATER IN RELATION TO BODY WEIGHT. J. MARIE, Bull. Soc. de pédiat. de Paris **33**:226 (March) 1935.

A girl 4 months old had a fever for two months. The feeding consisted of 1 tablespoonful of a dry milk powder, 1 teaspoonful of sugar and 100 Gm. of water, given six times daily. There was a satisfactory gain in weight, and the general condition was good. The only treatment was to change the feeding to 125 Gm. of a buttermilk preparation, given six times daily. The temperature immediately became normal, and the infant continued to gain weight. The explanation of the condition is found in the fact that dry milk has a very high protein content and requires, therefore, a good deal of water for its combustion and for elimination of the excretory substances, chiefly, urea. There was also an insufficient intake of water in relation to the body weight.

BENJAMIN, Montreal, Canada.

DEHYDRATION IN NUTRITIONAL DISTURBANCES OF INFANCY. E. SCHNEEGANS, Rev. franç. de pédiat. **11**:717, 1935.

The hydration of the blood was determined by the weight of the blood before and after desiccation. The water content of the blood of normal infants was found to increase slightly but definitely during the first four or five months after birth and then to remain practically stationary. Slight clinical dehydration was not reflected in the blood, but in severe dehydration a decrease of from 2.5 to 6 per cent in the water content of the blood was noted. At no time was a value more than 6 per cent below normal found.

LESLIE, Evanston, Ill.

CONTAMINATION OF MILK. A. FOURNIER, Rev. franç. de pédiat. **11**:771, 1935.

Fournier presents methods for determining and indicating contamination of milk. These are based on the weight of foreign material per liter and the development of acidity.

LESLIE, Evanston, Ill.

CONCENTRATED, HEMOGENIZED, STERILIZED, UNSWEETENED MILK. R. MATHIEU, Rev. franç. de puériculture **3**:209, 1935.

A review of the manufacture, biologic properties and use in infant feeding of evaporated milk in the United States is given.

CRANE, Chicago.

AN ANALYSIS OF METHODS USED IN INFANT FEEDING. PEDRO DE ALCANTARA, J. de pediat., Rio de Janeiro **3**:393 (Sept.) 1936.

Using the various body measurements that have been advocated for the calculation of caloric requirements, the author discusses the amounts of food elements given in different types of feeding.

SANFORD, Chicago.

RELATION BETWEEN THE QUALITY OF NUTRITIONAL PROTEIN AND ITS INFLUENCE ON THE ENERGY EXCHANGE. A. BICKEL, Arch. f. Kinderh. **107**:1, 1935.

A method previously described by Bickel for demonstrating qualitative variation in metabolism by estimating the ratio of nonoxidized carbohydrate in the urine to urinary nitrogen (the carbohydrate-nitrogen quotient) and Müller's method, by which the total unoxidized substances in the urine are compared with the nitrogen (the unoxidized substance-nitrogen quotient), were used in a study of protein metabolism in rats. Other animal proteins gave the same low quotients as casein, which was taken as a standard, while vegetable proteins gave higher quotients. Gelatin and wheat protein were exceptions, giving results different from either of the two groups mentioned.

The difference in the metabolism of the proteins might be due to differences either in the constituent building stones or in the molecular structure of the

proteins. That they are due to the differences in molecular structure seems indicated by a change observed in the metabolism of casein after its structure was changed by irradiation with the gamma rays of mesothorium.

CRANE, Chicago.

SO-CALLED NORMAL LEAD CONTENT OF WOMAN'S MILK. M. KASAHARA and S. I. NOSU, Jahrb. f. Kinderh. **145**:78 (Aug.) 1935.

The milk of "lead-free" healthy women contains from a trace to 0.18 mg. of lead per liter. The occurrence of lead in the milk is dependent to a certain degree on the use of water mains made in part from lead. LANDAU, Hannibal, Mo.

FAT AS A CAUSE OF DIGESTIVE DISTURBANCE. U. S. RUŽIČIĆ, Monatschr. f. Kinderh. **66**:1 (June) 1936.

In an effort to determine whether fat produces digestive disturbances in artificially fed infants, Ružičić fed one infant cow's milk containing the fat of breast milk and another cow's milk without the fat. He could observe no difference in the general nutrition or gastro-intestinal symptoms of the two infants and submits this evidence as an argument against the incrimination of fat.

GERSTLEY, Chicago.

PHYSIOLOGIC SUGAR IN THE NUTRITION OF INFANTS. G. MALYOTH, Ztschr. f. Kinderh. **56**:590 (Sept. 11) 1934.

Depending on the type of amylase, starch breaks up into alpha or beta maltose and dextrin. By the use of an alpha amylase prepared from a growth of Aspergillus, fermentation of starch was obtained which proceeded until a mixture of dextrin and maltose similar in composition to the dextrimaltose mixtures commonly used in infant feeding had resulted. In a series of feeding experiments on infants, the carbohydrate mixture thus produced was found much superior to others. Malyoth thinks the carbohydrate under consideration can be regarded as being physiologic (*Körpernahe*) because the ferment producing it is similar to the starch-splitting pancreatic ferment. Materials occurring in combination or in accompaniment with the carbohydrate may be of importance in its superiority.

SIEMSEN, Chicago.

MATERIALS CONTRIBUTIVE TO THE STUDY OF THE QUANTITY OF ENERGY SPENT BY CHILDREN OF VARIOUS AGES FOR PHYSICAL WORK. I. D. KAPLAN, Azov-Black Sea Regional Pub. Co., symposium 3, article 8, 1935.

Kaplan studied 101 children from 9 to 14 years of age, in two groups. In one group the energy output was studied in relation to weight; in the other, in relation to physical work. The energy output during physical exertion was found to be highest between the ages of 9 and 10 years, decreasing thereafter. The power of work, however, was increased with advance in age while energy output, in relation to the amount of work, was decreased.

SEMENENKO-MCKHANN, Boston.

Vitamins; Avitaminoses

RELATION OF VITAMIN A TO ANOPHTHALMOS IN PIGS. F. HALE, Am. J. Ophth. **18**:1087 (Dec.) 1935.

Hale noted anophthalmos in all of a litter of eleven pigs of a gilt of the Duroc breed which had been fed a vitamin-free diet for three months before breeding and one month after breeding. Since similar anomalies had never been observed in this herd it was assumed that the maternal deficiency of vitamin A had caused

the ocular anomaly. A second experiment was unsatisfactory in that one gilt failed to show the symptoms of estrus, and the other failed to farrow, postmortem examination indicating that the litter had perished at an early stage and that this was followed by complete resorption of the fetuses. Another gilt which had gone through a six month period without vitamin A had a litter of ten pigs all of which showed anophthalmos. A second gilt to which a 2 ounce (56.7 Gm.) dose of cod liver oil had been given at the end of the sixth month because of weakness produced a litter of fourteen pigs all of which were blind and showed combinations of ocular defects such as anophthalmos; some had one eye; some, one large and one small eye. In both litters there were other anomalies. Hale rules out the possibility that this was due to heredity by showing that on various matings of the blind pigs with each other and with normal pigs the offspring were all normal. These studies leave no reasonable doubt that a maternal deficiency of vitamin A will be expressed in a variety of defects in the offspring, including blindness, even failure of complete development of the eyes, cleft palate, harelip and arrested ascension of the embryo kidney. REESE, Philadelphia. [ARCH. OPHTH.]

MOTOR FUNCTIONS OF THE BOWEL IN AVITAMINOSIS B AND IN STARVED ANIMALS. D. D. CHATTERJEE, Indian J. M. Research **23**:191 (July) 1935.

There is diminution of the number, amplitude and intensity of intestinal movements. Responses to pilocarpine, atropine and nicotine are present but diminished. Response to barium chloride is absent. SNELLING, Toronto, Canada.

INFLUENCE OF FACTORS NOT ALIMENTARY ON THE SYNTHESIS OF VITAMIN C IN THE ANIMAL ORGANISM. P. ROHMER, N. BEZSSONOFF and E. STOERR, Compt. rend. Soc. de biol. **118**:58, 1935.

Milk from cows from three provinces of central dairy districts of Strasbourg were tested the year round for its content of vitamin C by means of the violet reaction of Bezssonoff. It was found that from October to May there was marked deficiency, while from May to October the amount was from 20 to 30 mg. per liter. This was believed to be due to the fact that the sun's rays were absent. It was also thought that the lower temperature had an influence just as possibly with the synthesis of vitamin A. (No mention is made of the dietary factor.)

WAHL, Cleveland.

ACTION OF CEVITAMIC ACID IN THE DIFFERENT STAGES OF EXPERIMENTAL SCURVY. G. MOURIQUAND, V. EDEL, A. COEUR and J. JOLY, Compt. rend. Soc. de biol. **118**:886, 1935.

Marked scurvy was produced in guinea-pigs beyond the hemorrhagic tumefaction to diarrhea and dystrophy. Cevitamic acid was then given; the appetite at once improved, the hemorrhages decreased, and the dystrophy greatly improved. Nevertheless, the animals died. The authors believe that the nutritional metabolic state was too abnormal in this advanced scurvy to respond to the antiscorbutic.

WAHL, Cleveland.

THE INTESTINE AS A DEPOT FOR CEVITAMIC ACID. E. JACOBSEN, Compt. rend. Soc. de biol. **118**:925, 1935.

In guinea-pigs following a vitamin C free diet for a few days which were fed cevitamic acid up to one dose of 50 mg. daily, there was found rapid absorption of this vitamin through the intestine, especially through the cecum. Within an hour the cevitamic acid content of the intestinal wall was at a maximum, whereas a maximum was reached in the liver and adrenal glands in four hours; but twenty hours later the vitamin levels had fallen to normal. WAHL, Cleveland.

AMOUNT OF VITAMIN C IN URINE AND BLOOD AFTER ADMINISTRATION OF MASSIVE DOSES. P. ROHMER, N. BEZSSONOFF, E. STOERR and J. PÉRIER, Compt. rend. Soc. de biol. **118**:1091, 1935.

In hemorrhagic diathesis and hemophilia, the hemostatic action of vitamin C is absent (Boger and Schroeder) regardless of the method of administration. Banke has shown that cevitamic acid acts on scurvy whether given orally, intravenously or intramuscularly.

Large doses, 200 mg. per kilogram, were given subcutaneously and intramuscularly to rabbits, guinea-pigs and infants, with subsequent Bezssonoff determinations on the urine and blood.

In the infants, in two hours, 12 mg. of the vitamin per liter of blood was found, and then the amount gradually decreased to normal; in fourteen hours and up to twenty-three hours later a rise from 8 to 33 mg. per liter of urine occurred. Similar results were obtained in the guinea-pigs and rabbits.

WAHL, Cleveland.

BIOCHEMICAL RESEARCHES ON SPONTANEOUS CALCIFICATION OF BONE IN THE COURSE OF EXPERIMENTAL RICKETS IN THE RAT. I. GARCIA, Compt. rend. Soc. de biol. **119**:111, 1935.

In rachitic rats, even though the roentgenograms of the bones show complete healing under therapy, the phosphorus-nitrogen ratio remains subnormal, as does the total phosphorus content. Healing takes place, with a reorganization of proteins as well as a deposition of salt (calcium plus phosphorus). It is implied that this fact indicates why previously rachitic bones, even after healing (roentgen evidence), are fragile.

WAHL, Cleveland.

PHOSPHORUS-NITROGEN RATIO OF BONE TISSUE IN THE COURSE OF EXPERIMENTAL RICKETS IN THE RAT. I. GARCIA, Compt. rend. Soc. de biol. **119**:139, 1935.

Rickets in rats on diets devoid of vitamin D was measured as to degree in roentgenograms. Also, the fresh and dried bones were analyzed. The water content of the fresh bones was increased over that of normal bones. The nitrogen content in fresh bones was normal, and that in dried bones was greatly increased. The phosphorus content was greatly diminished in both.

WAHL, Cleveland.

RACHITOGENIC ACTION OF CEREALS. G. POPOVICIU, G. BENETATO and R. OPREAN, Compt. rend. Soc. de biol. **119**:445, 1935.

The experiments reported are in a large measure repetitions of the authors' own experiments and of those particularly of György in vitro, with a p_H of 8.4 and with use of pancreatic enzymes and enterokinase for the digestion of wheat, corn and rye, in the presence of added sodium chloride, with subsequent analyses of the filtrates following digestion for calcium and phosphorus. The values for calcium and phosphorus were decreased with corn especially. The calcium was augmented in all instances to normal in the presence of sodium chloride.

WAHL, Cleveland.

EXPERIMENTAL CONTRIBUTION TO THE STUDY OF AVITAMINOSIS B: THERAPEUTIC TESTS. J. JOACHIM and E. KODÍČEK, Časop. lék. česk. **74**:545 (May 17) 1935.

The authors review the literature on vitamin B. Cysteine (0.05 Gm.), detoxin (0.5 cc.), ergot (0.005 Gm.), cortin and organon (both extracts of adrenal cortex) (0.05 cc.), and cevitamic acid (0.01 Gm. and 0.02 Gm.) were tested for their possible curative effect on adult rats suffering from avitaminosis B, and all were without effect.

STULIK, Chicago.

THE USE OF CEVITAMIC ACID IN PEDIATRICS. A. SZENDEY, Orvosi hetil. **80**:636 (July 5) 1936.

Szendey used a preparation of cevitamic acid, injecting it intravenously and intramuscularly; the tablet (0.15 grain [0.009 Gm.] of cevitamic acid) can also be used. He saw a good effect in stomatitis ulcerosa (several cases), complete recovery following from two to five injections. There was also a good effect in Werlhof's disease (two cases), hemophilia (one case) and in Henoch's purpura (seven cases). In melena (two cases) an effect could not be demonstrated. Proscorbin did not produce any result in acute hemorrhagic nephritis or in dysentery.

GÖTTCHE, Budapest, Hungary.

TISSUE OXIDATION IN AVITAMINOSIS B_1 AND INANITION. HÅKAN RYDIN, Upsala läkaref. förh. **41**:1 (Oct.) 1935.

Experimental work is presented which attempts to settle the prevailing controversy concerning tissue oxidation in association with avitaminosis B_1. Rydin thinks that the diversity of opinions is due probably to the fact that insufficient material has been studied, that no uniformity of methods has been used and that most workers have drawn unwarranted generalizations from their results. While some authors obtained reduction in tissue oxidation in experimental deficiency of vitamin B_1, others could not substantiate this finding. The controversy is particularly outspoken on the question whether the reduction in tissue oxidation is specific for this avitaminosis or whether it is caused by simultaneously occurring inanition. Rydin thinks that the problem may be clarified by the determination of the tissue oxidation in association with vitamin B_1 deficiency in various organs of various species, with a number of methods. He investigated oxidation in muscle tissue in pigeons kept in a state of vitamin B_1 deficiency and inanition under various experimental conditions. Similar determinations under identical experimental conditions were made also with other organs, such as the brain, kidney and liver, and with blood corpuscles. Tissue oxidation was determined in the same animal with both the indicator and the gaseous analytic method.

Tissue oxidation was studied on finely minced organs with the microrespirometer method of Warburg and Barcroft and with the methylthionine chloride method of Thunberg. Avitaminosis was produced by a diet of polished rice.

A comparison of the muscle oxidation in normal pigeons and in pigeons with vitamin B_1 deficiency showed reduction in the tissue oxidation in the latter group with or without the use of lactate in the suspension fluid. The tissue oxidation of the normal pigeons used as controls showed great individual variations.

Oxygen consumption of musculature deficient in vitamin B_1 was lower than that of normal musculature, with beriberi broth used in the suspension fluid in both series of tests. Full grown musculature showed greater tissue oxidation in normal broth than in beriberi broth. Muscle oxidation was lower during the period of vitamin B_1 deficiency. In acute stages of beriberi greater tissue oxidation was shown than in the chronic stages when the microrespirometer method was used. The methylthionine chloride method failed to give similar results.

Inanition caused by insufficient intake of a diet containing vitamin B_1, with loss of weight comparable to that in pigeons with vitamin deficiency, resulted in lower muscle oxidation. Comparative studies of muscle oxidation in normal, in vitamin-deficient and in starving pigeons revealed similar results in the vitamin-deficient and starved animals. In these two groups the tissue oxidation was decreased as compared with that in normal control pigeons. Determinations with the microrespirometer revealed weaker tissue oxidation in vitamin-deficient brain substance than in brain tissue of normal and starving pigeons. Vitamin-deficient tissue showed decreased ability to oxidize lactates. Crystalline vitamin B_1 increases tissue oxidation in the test tube when brain tissue of animals with vitamin deficiency and signs of peripheral neuritis is used. Rydin believes that his experiments with brain substance prove that vitamin B_1 possesses a specific action in the oxidation of brain tissue.

NOTKIN, Poughkeepsie, N. Y. [ARCH. NEUROL. & PSYCHIAT.]

RICKETS IN ADULT RATS. M. DE BRUIN and J. BOUMAN, Nederl. tijdschr. v. geneesk. **80**:2111 (May 16) 1936.

Adult rats kept on a diet to which no special source for vitamin D was added showed rachitic signs in nine months. The addition of 0.125 microgram of crystalline vitamin D (calciferol) a day is sufficient to prevent rickets on this diet. In connection with this experiment the possibility is considered of symptoms of hypovitaminosis D in young human adults. A careful investigation on man in this respect is desirable.

VAN CREVELD, Amsterdam, Netherlands.

Hygiene; Growth and Nutrition; Public Health

REPORT OF SPECIAL SCHOOL HEALTH STUDIES IN NEW YORK CITY. D. B. ARMSTRONG, Am. J. Pub. Health **25**:15 (Jan.) 1935.

Armstrong reports briefly on the reasons why extreme defects in vision, teeth, nutritional status and hearing remain uncorrected in school children. In nine tenths of the children with defective hearing, two thirds of those with defective vision, two thirds of those with malnutrition and one half of those with severe dental disturbances no notice of the defect had been transmitted to the parents. In the cases of defective hearing the fault was due to failure to detect the defect. In cases of dental defects the important factors were the overwhelming number of children and the poor method for marking the defects. Defects in vision and nutrition often are overlooked, and the follow-up investigation may be superficial and ineffectual. The detection of tonsillar defects is difficult because of the lack of definite criteria as to what constitutes a serious defect. Armstrong pleads for more cooperation between the physician and teachers, suggests that fewer and better examinations be done and that more emphasis be placed on correction of severe defects.

MCBRYDE, Durham, N. C.

HOUSING PROBLEM IN A SOUTHERN CITY WITH SPECIAL REFERENCE TO ITS INFLUENCE ON RESIDUAL TYPHOID FEVER AND ON INFANT MORTALITY. L. M. GRAVES and A. H. FLETCHER, Am. J. Pub. Health **25**:21 (Jan.) 1935.

The typhoid rate and the infant mortality rate in wards for both colored and white races were in direct proportion to the percentages of patients from the slums. The typhoid rate, but not the rate of infant mortality, showed a relation to wards when the grouping accorded to percentages of living units without private toilets.

MCBRYDE, Durham, N. C.

REDUCTION OF MATERNAL AND INFANT MORTALITY IN RURAL AREAS. J. H. M. KNOX JR., Am. J. Pub. Health **25**:68 (Jan.) 1935.

The unduly and unnecessarily high rural maternal and infant mortality in this country can be decreased if local health officers enlist the organized, active support of those citizens who are accustomed to aiding a community enterprise. Organized corrective measures should be guided by the best available professional advice.

MCBRYDE, Durham, N. C.

A SCHOOL HEALTH PROGRAM AS AN EDUCATIONAL ACTIVITY. D. W. GUDAKUNST, Am. J. Pub. Health **25**:463 (April) 1935.

A school health program, to be successful, must be built around the full life of the child. The school doctor and nurse, the teacher, the physicians of the community, the social and welfare agencies and all other forces that can influence the physical well-being of the community must participate. The school's function is mainly educational. It must teach what constitutes good health and also what constitutes proper advice on health. The development of self-reliance in securing aid to health is essential. This should be available through the individual physicians to the entire family group.

MCBRYDE, Durham, N. C.

PHYSICAL DEFECTS OF CHILDREN OF PRESCHOOL AND SCHOOL AGE. EDWIN A. SOCOLA, New Orleans M. & S. J. **89**:221 (Nov.) 1936.

Socola reviewed the records of school children and found that 70 per cent showed physical defects. Disease of the tonsils, adenoids and teeth occupied the forefront. Overnutrition, undernutrition and ocular disturbances were frequent. He urges that the physical welfare of the preschool child should be stressed, and that closer cooperation should exist between the various health agencies and physicians in educating parents to pay more attention to their preschool children. By this education the defects in evidence in the school child should be greatly reduced.

BERKLEY, Los Angeles.

A CENTER FOR THE ACQUISITION AND DISTRIBUTION OF MOTHER'S MILK IN MONTEVIDEO. J. A. BAUZÁ, Bol. Inst. internac. am. de protec. a la infancia **10**:196 (Oct.) 1936.

Bauzá states that the supply of mother's milk in large quantities is not a problem difficult of solution.

The danger of the mothers selling their milk in detriment to their own children is reduced by legal regulations similar to those established by the Roussel Act in France. Since 1919 the Uruguayan law forbids a women to engage as a wetnurse unless she has suckled her own baby during a minimum period of six months.

The Center for the Acquisition and Distribution of Mother's Milk was created in 1925 at the author's request, as a department of the Casa del Niño. The sale is authorized only after the three following requirements have been met: The minimum age of the child shall be 4 months; the weight of the child shall be above normal, and the health of the milk giver must be established. The quantity of the surplus milk to be sold is fixed at the beginning; it is increased gradually, but without neglecting the increase in the weight of the woman's own child. When the child is more than 6 months old, the mother is allowed to sell all the milk she can give.

The permit to sell milk must be signed every month by the medical officer of the division of wetnurses, after the good health of the woman's child has been verified.

The extraction of milk is done by manual pressure and with great care to maintain aseptic conditions in the handling of the breast and in the hands, clothes, flasks and other appurtenances.

For the preservation of this milk, Bauzá employs the drying system of Krause and obtains a product that may be preserved unaltered during many months; children who are fed on it develop satisfactorily. He also has tried preservation by means of double or triple pasteurization at intervals of six hours, at 85 C., during one minute; after six months the milk presents no visible alteration. To preserve milk a few days only, freezing is sufficient, and solidified carbon dioxide is to be preferred above other means of freezing.

Mother's milk is bought at $1.80 and sold to private families at $2.50 a liter, the gain thus obtained permitting gratuitous supply of such milk to children of necessitous families that attend the milk stations.

As the accompanying chart shows, 2,730 liters were distributed in 1935 between the crèche and outside children of dependent families, and 2,438 liters were sold. The progress of the center is evident if one compares the 333 liters of 1925 with the 5,165 liters that were bought in 1935.

EDITOR'S SUMMARY.

THE FUNCTION OF KINDERGARTENS AND MOTHERS' CLUBS IN CHILD WELFARE. C. MUNIAGURRIA, Bol. Inst. internac. am. de protec. a la infancia **10**:205 (Oct.) 1936.

Muniagurria refers to the work carried on since 1915 by the Sociedad Amigos de la Educación, Paraña, Argentine Republic. It has started dental and ophthalmologic clinics and nineteen milk stations in the schools; it has provided schools

with furniture and teaching material, and it will now complete its work by means of a kindergarten and a mothers' club.

The necessity of preschool care in order to prevent physical and psychic evils is indicated. The cooperation between the kindergarten and the mothers' club will realize the fruitfulness that fraternity in child hygiene and education means.

It would be useful to make a census before starting the new organizations. The file card should contain data on the individual and biotypologic, psychopedagogic and social environments. This information will be obtained and studied by a committee of pediatricians, teachers and social workers. At this point the author enters into lengthy considerations of the significance of the work of social visitors.

After obtaining the information mentioned the mothers' club and the kindergarten will be able to develop their program, which should be primarily prophylactic; nontechnical lectures within easy reach of all the mothers will be found useful in such an endeavor.

EDITOR'S SUMMARY.

BRINGING UP CHILDREN IN INSTITUTIONS OR ADOPTED FAMILIES. B. BOBROWSKA, Zycie Dziecka **4**:184 and 193 (July-Aug.) 1935.

After an extensive discussion of the problems pro and con Bobrowska comes to the conclusion that it is more beneficial for children to be brought up in an institution than to be brought up in an adopted family.

However, in discussion of the article Helena Stawinska comes to no conclusion, and the question is still unsolved. She favors the family bringing up, with the statement that the life of the child brought up in the adopted family is more normal and happier and that the child is made to realize that family life is the cornerstone of a nation.

KRUPINSKI, Chicago.

Prematurity and Congenital Deformities

CONGENITAL DEFECTS OF THE FEMUR, FIBULA AND TIBIA. ERNEST FREUND, Arch. Surg. **33**:349 (Sept.) 1936.

The question of congenital deformities and defects of the extremities is thoroughly discussed by Freund. Classification is difficult because defects of the femur or of the fibula frequently are associated with other deformities. It is pointed out in the review that in many instances the deformity is due to an intrinsic disturbance of growth of the extremity and not to external factors, such as amniotic constriction or adhesions. The report includes a description of numerous cases, well illustrated with photographs and roentgenograms.

KAISER, Rochester, N. Y.

CONGENITAL SUBLUXATION OF THE LENS AND ARACHNODACTYLIA. R. ISNEL and HAKAMI, Bull. Soc. d'opht. de Paris, June 1935, p. 373.

Isnel and Hakami review the cases of this abnormality which have been presented since Marfan demonstrated it in 1896. Their patient, aged 27, had noticed a diminution in vision. The past and familial history were unimportant. The right eye showed superior luxation of the lens, microcornea, iridodonesis, pronounced myopia and chorioretinal lesions but no hypertension of the globe. The left eye showed total luxation of the lens, microcornea, iridodonesis and ocular hypertension of 50 mm. The vision of the right eye was 1/10; that of the left, 1/50. The general appearance was that of arachnodactylia. Measurements are given. Serologic tests gave negative results.

MAYER, Chicago. [ARCH. OPHTH.]

ANOMALIES OF THE BUCCAL APPARATUS. B. LANDETE ARAGÓ, Arch. españ. de pediat. **20**:293 (May) 1936.

Landete Aragó presents a discussion of anomalies of the mouth, with a classification, and data on their frequency and their treatment.

SCHLUTZ, Chicago.

SPINA BIFIDA WITH MENINGOCELE AND MYELOMENINGOCELE. O. P. CAMPOS, Arch. de pediat., Rio de Janeiro **7**:518 (Sept.) 1936.

This is an excellent article on the anatomy, pathology and clinical phases of this condition. There are numerous illustrations. The author does not believe that the cystic sac of a myelomeningocele should be operated on before the patient is 4 years of age. Spina bifida, owing to the tendency to infection during the first fifteen days, demands immediate action. In the Hospital Jesus, Rio de Janeiro, Brazil, it has been the custom to cover the sac with an autoplastic skin graft; in this way complications due to leakage, such as infection, are avoided.

SANFORD, Chicago.

HEALTH PROBLEMS IN THE SCHOOL. M. GESTEIRA, Pediat. e puericultura **4**:465 (June) 1935.

The program in Brazil, as outlined by Gesteira, who is director general of health for the city of Bahia, has in view (1) the health of the scholars, (2) the health of the community from which the scholars are drawn, (3) the health of the teachers and (4) correction of the existing deficiencies and proper teaching of sanitation.

SANFORD, Chicago.

DYSTOCIA CLEIDOCRANIALIS. G. ZIMMERMANN, Arch. f. Kinderh. **107**:21, 1935.

A case is reported.

CRANE, Chicago.

AN ISOLATED CASE OF CRANIOFACIAL DYSOSTOSIS (CROUZON). A. VAN LINT, L. VAN BOGAERT and R. THIENPONT, J. belge de neurol. et de psychiat. **35**:65 (Feb.) 1935.

The authors present the case of a boy 11 years of age, who was the only child of healthy parents. He was born at term; delivery was easy, and he appeared normal at birth. He was fed by breast until he was 4 months old. When he was 6 months of age, the parents noticed progressive bilateral exophthalmos and a change in the shape of the skull. At the age of 1 year a mass began to form in the region of the anterior fontanel, and vision appeared to be poor. These symptoms increased until the age of 7 years, after which they appeared to be stationary. On examination there was a mass the size of an orange in the region of the anterior fontanel. This was hard, somewhat elongated and without pulsation. The skull was strongly brachycephalic, with widening of the parietotemporal region. A description of the face is characteristic. There was projection of the mandible, the upper lip was thin, the nasolabial groove was very marked, and there was a parrot-like nose, the base of which was extended and prolonged into the superciliary ridges. There was marked exophthalmos with an associated marked divergent strabismus. The neck was short and the thorax small. There were no symptoms of rickets. The rest of the body was more or less normal. Ocular examination showed that the patient could count fingers at 10 cm. There was myopia of 2 diopters with astigmatism. There were slight horizontal nystagmus and atrophy of the optic nerve. Laboratory examinations gave negative results.

The differential diagnosis lay between craniofacial dysostosis and oxycephaly, the important points in favor of the former being the facial aspect, the exophthalmos with divergent strabismus and the date of appearance of the deformities. The cause and genesis of the condition are unknown; presumably it is a hereditary anomaly. No definite hereditary taint was disclosed in the patient's family history.

WAGGONER, Ann Arbor, Mich. [ARCH. NEUROL. & PSYCHIAT.]

NEVI OF SKIN ASSOCIATED WITH INTRACRANIAL ANGIOMAS AND HYDROPHTHALMOS. G. KREYENBERG and I. HANSING, Ztschr. f. d. ges. Neurol. u. Psychiat. **152**:751 (May) 1935.

Kreyenberg and Hansing report three cases of cutaneous nevi associated with intracranial angiomas and hydrophthalmos, with one autopsy. While usually the

nevus is on the same side as that of the lesion of the brain, there was also involvement of the skin on the other side in these cases. In each case an extensive nevus of the skin, congenital glaucoma on the side of maximum involvement, jacksonian epilepsy and mental deficiency were shown. Angiomas of the type reported usually arise from vessels of the pia. The affected cerebral hemisphere is usually smaller. Emphasis is placed on the diagnosis of intracranial angiomas during life by means of roentgenography, when calcified vessels are present. Calcification occurs frequently and has proved useful in diagnosis. In the first case such calcifications showed clearly. Thickening of the bones of the skull on the affected side is related to defective development of the underlying hemisphere.

SAVITSKY, New York. [ARCH. NEUROL. & PSYCHIAT.]

A CASE OF PERSISTENT DUCTUS OMPHALOMESENTERICUS. DAGMAR KUČERA, Časop. lék. česk. **74**:547 (May 17) 1935.

A short review of the literature is followed by a case report. A baby of 6 weeks with an adherent navel cord had shown periodic vomiting, which was controlled by a diet of weak tea. Pemphigoid lesions of the abdomen disappeared after the institution of intramuscular treatment with blood. A granuloma with a seropurulent discharge persisted after desquamation of the cord. Probing of the umbilicus revealed a sinus 4 cm. long in the direction of the symphysis pubis. Bacteriologic investigation gave negative results. Roentgen examination following use of opaque material revealed a patent omphalomesenteric duct. Spontaneous healing resulted.

STULIK, Chicago.

New-Born

ANOMALIES OF THE SKULL IN THE NEW-BORN, WITH SPECIAL REFERENCE TO "RELIEF" OR LACUNA SKULL (LÜCKENSCHÄDEL). H. D. KERR, Am. J. Roentgenol. **30**:459 (Oct.) 1933.

Kerr presents three cases of a condition in new-born infants: numerous parchment-like laminae throughout the flat bones of the skull, not due to hydrocephalus but usually associated with spina bifida. The occurrence of "relief" or "lacuna" skull with meningocele and spina bifida is emphasized. The etiologic basis is regarded as an intra-uterine increase in intracranial pressure. This increased pressure may not be manifest after birth because of the safety valve action of the meningeal sac. The cranial and cerebral changes have taken place previously. The additional factor of premature closure of the cranial sutures is also brought out.

STULIK, Chicago.

ACIDOSIS DURING THE PRELACTEAL PERIOD: ITS PREVENTION BY THE USE OF DEXTRIMALTOSE CONTAINING SODIUM CITRATE. HOWARD L. EDER, Arch. Pediat. **53**:408 (June) 1936.

A 5 per cent solution of dextrin and maltose containing 1 grain (0.064 Gm.) of sodium chloride and 5 grains (0.32 Gm.) of sodium citrate in each 2 ounces (59.14 cc.) of mixture was administered to approximately eight hundred newly born infants during the prelacteal period. None of them acquired jaundice or inanition fever. Prior to the use of this solution approximately 60 per cent of all newly born infants acquired jaundice and 10 per cent acquired inanition fever. Two ounces (59.14 cc.) of the solution is given every two hours during the first twenty-four hours of life and after the breast feeding every three hours for the first five days thereafter.

A review of one hundred consecutive cases shows that 66 per cent of the infants had regained their initial loss of weight by the eighth day, 77 per cent by the tenth day and 87 per cent by the fourteenth day.

ORR, Buffalo.

THE HEMATOLOGY OF SEPSIS OF THE NEW-BORN. R. M. GREENTHAL, Arch. Pediat. **53**:583 (Sept.) 1936.

In a 1 week old male infant, in the subcutaneous tissues of the left buttock, an abscess developed. The leukocyte count was 37,400, with 19 per cent monocytes. Subsequent blood counts showed a reduction in the number of leukocytes and a gradual return to normal levels of all of the blood elements.

ORR, Buffalo.

VOMITING IN THE NEW-BORN. H. A. REISMAN, Arch. Pediat. **53**:617 (Sept.) 1936.

The various causes of vomiting during infancy are reviewed by Reisman. Twenty cases of pyloric stenosis are reviewed and classified as to the age of onset of the vomiting. Nineteen of the infants were operated on, with a mortality of 15.8 per cent.

ORR, Buffalo.

TREATMENT OF OPHTHALMIA NEONATORUM. J. G. BELLOWS, Illinois M. J. **70**:154 (Aug.) 1936.

From a study of 188 cases of ophthalmia neonatorum in which treatment was give at the Cook County Hospital, in a period extending over three years, Bellows concludes that the treatment of gonorrheal ophthalmia neonatorum is chiefly a problem in prevention. No substitute for silver nitrate should be used in carrying out prophylaxis. In the order of their importance in the treatment of gonorrheal ophthalmia neonatorum are irrigation, foreign protein therapy and the use of antiseptic solutions. Protein silver has no place either in the prophylaxis or in the treatment of this condition. Finally, the use of a 1:1,500 acriflavine solution has been found to shorten the period of morbidity.

BARBOUR, Peoria, Ill.

HEMORRHAGE OF THE NEW-BORN WITH UNUSUAL LOCALIZATION. PIGEAUD and LYNETTE, Bull. Soc. d'obst. et de gynéc. **25**:85 (Jan.) 1936.

Two cases are reported. The first patient was an infant delivered by a breech extraction from a mother with a small pelvis. The infant weighed 2,400 Gm. and was dead when born. There was a large hematoma on the lower surface of the liver. There was also bloody ascites due to rupture of a smaller hematoma of the liver, a meningeal hemorrhage and hemorrhage of the lungs. The second case was an instance of intraventricular hemorrhage in a new-born infant weighing 1,950 Gm., who died forty-eight hours after birth. Labor had been prematurely induced because of a mitral lesion in the mother. The authors express the belief that intraventricular hemorrhage of the new-born is frequently overlooked because of the technic employed in the necropsy.

GLASER, Rochester, N. Y.

OBSTETRIC TRAUMA INVOLVING THE UPPER EXTREMITIES. P. MULLER, Bull. Soc. d'obst. et de gynéc. **25**:96 (Jan.) 1936.

Muller reviewed the records of 13,451 deliveries in Strasbourg in the years from 1925 to 1935. In this period there were two cases of injury to the nerves involving the upper arms. Both these occurred in head presentations, which offered no particular difficulty in the extraction of the shoulders, and both were of the Duchenne-Erb type. There were nine fractures, six of the humerus and three of the clavicle. The three fractures of the clavicle occurred in vertex presentations. The fractures of the humerus were all of the diaphysis and occurred twice in breech presentation and four times in vertex presentation.

GLASER, Rochester, N. Y.

PETROSAL RESISTANCE OF NEW-BORN INFANTS TO BIRTH INJURIES. G. KELEMEN, Monatschr. f. Ohrenh. **69**:1496 (Dec.) 1935.

Kelemen reports microscopic studies on the petrosas of infants who were born by cranial perforation. To be sure, the perforation was not the only intervention to which the craniums of these children had been subjected, for manipulation with forceps and efforts at extraction usually preceded the perforation. In the course of his studies the author found no fractures in the petrosas. The changes consisted chiefly of hemorrhages which were detected from the tympanic membrane to the internal auditory meatus, whereas the spaces of the internal ear were only slightly involved. Signs of inflammation were found widely distributed. The author thinks that if later in life auditory impairment is ascribed to trauma at birth, attention should be given to the changes that are caused by hemorrhage and inflammation of the soft parts (mucous membrane and nervous apparatus) and not so much to those in the bone tissue. To be sure, bleeding and medullary inflammation may develop in the bones in the course of birth trauma, but not fractures.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

NECROSIS OF THE SUBCUTANEOUS FAT IN NEW-BORN INFANTS. J. BERNHEIM-KARRER, Ztschr. f. Kinderh. **55**:695, 1933.

Bernheim-Karrer describes fifteen additional cases of necrosis of the subcutaneous fat in new-born infants. In one case the condition was congenital, and in several cases there was necrosis of the fatty tissue of the kidneys. In some cases the necrosis resulted in calcification. The author discusses various theories as to the cause of this condition but believes that trauma at birth is the most frequent cause.

LEVINSON, Chicago.

SUBCUTANEOUS FAT NECROSIS OF THE NEW-BORN. J. ZIMÁK, Bratisl. lekár. listy **15**:617 (March) 1935.

Zimák reviews the literature, which contains reports of 152 cases, including the present one. In discussing the etiology, he mentions the trauma of difficult labor, angiotrophic reaction, deviation of internal secretions, infection and hypercholesteremia. In the detailed report of a case he cites the first subcutaneous changes on the third day of life following a difficult delivery with high-placed forceps. Various preparations, such as solution of aluminum acetate, were used locally on the indurated areas. The tendency is toward gradual restitution, but in this instance the baby died of associated bronchopneumonia on the twenty-fourth day of life. The disease may be reproduced in animals by subcutaneous injections of palmitic acid. The differential diagnosis may include erysipelas, phlegmonous infiltration, subcutaneous abscess and scleroderma.

STULIK, Chicago.

ATRESIA OF THE GASTRO-INTESTINAL TRACT IN A NEW-BORN INFANT. JAN KOSSAKOWSKI, Pedjatrja polska **15**:229 (April) 1935.

Kossakowski reports a number of cases of atresia of the rectum and two cases of congenital atresia of the small and large intestine in which postmortem examinations were made. He brings out several points of importance; namely, if the baby begins to vomit soon after birth, abnormality in the gastro-intestinal tract should be looked for. Particularly if the baby has atresia of the anus and rectum, trouble in other parts of the gastro-intestinal tract should be looked for. Roentgen examination is important.

KRUPINSKI, Chicago.

CEPHALHEMATOMA OF THE NEW-BORN. ALF SJÖVALL, Acta obst. et gynec. Scandinav. **15**:443, 1936.

One hundred and seventy-one cases of cephalhematoma are discussed. The hematomas varied in size, time of appearance and period of duration. The age

of the mother, the weight of the fetus, premature rupture of the membranes and asphyxia were without relation to the condition.

A hemorrhagic diathesis and a contracted maternal pelvis seem to be the most probable predisposing factors in this condition. Negative pressure due to exposure of a portion of the skull through the dilating cervix or direct tangential pressure is the probable immediate cause. It is produced rarely in an infant who is dead before the onset of labor.

Seventy per cent of the hematomas occurred in children of primiparas. In 20 per cent of the cases there had been operative intervention at delivery. Sixty-three per cent of the infants were boys. ADAIR and POTTER, Chicago.

Acute Contagious Diseases

POSTTONSILLECTOMY WHOOPING COUGH. G. J. FELDSTEIN, Arch. Pediat. **53**:608 (Sept.) 1936.

Whooping cough developed soon after tonsillectomy in two children. This disease must be considered as an etiologic factor in the diagnosis of cough following tonsillectomy. ORR, Buffalo.

OCCURRENCE OF VIRUCIDAL SUBSTANCES IN PATIENTS WITH POLIOMYELITIS: THE BEARING ON SERUM TREATMENT AND VACCINATION. P. H. HARMON and H. N. HARKINS, Illinois M. J. **70**:289 (Sept.) 1936.

In this article Harmon and Harkins review the fundamental conceptions on which are based the methods for active immunization against poliomyelitis and for passive transfer of immune substances in the treatment of poliomyelitis. Their review and their opinions are summarized as follows:

Since poliomyelitis seems to be exclusively a disease of the nasopharynx and nervous system in man, the irregularity of extraneural migration of the virus is thought to explain the irregularity of the production of neutralizing antibody. The infection can be blocked by section of peripheral nerves or by section of the olfactory tracts. Chemical blockage of the infection at the nasopharyngeal portal appears to have been demonstrated recently. The latter method may have value in the prophylaxis of the disease in man.

The specific virus-neutralizing substance is unique in that a greater number of adults without a history of contact with poliomyelitis than of convalescents from the disease possess this substance. The average concentration of the immune substance in normal adults is equal to or greater than that in convalescents. The importance of an attack of poliomyelitis in the production of the substance is minimized by the present serologic studies.

Convalescent and other specific serum therapy should be continued, as there is no evidence that it is not of value. On the other hand, symptomatic improvement following the administration of serum is almost universal. There are indications that preparalytic poliomyelitis in man is a naturally milder type of disease than poliomyelitis seen after paralysis is present. At the present time specific vaccination is considered to be too dangerous to be applied to man without the careful supervision of a controlled study in nonepidemic months. BARBOUR, Peoria, Ill.

A FIVE YEAR REVIEW OF ANTERIOR POLIOMYELITIS IN THE CHICAGO AREA. S. O. LEVINSON, Illinois M. J. **70**:296 (Sept.) 1936.

Levinson reports observations of cases of acute poliomyelitis over a five year period. The progress of illness in most of the cases showed three fairly distinct phases. The first stage appears as a general systemic illness of one or two days' duration, simulating an upper respiratory or minor gastro-intestinal ailment. At this time a spinal puncture discloses a normal spinal fluid. It is apparent that at this time and with these findings no one can justifiably make a diagnosis of poliomyelitis. However, during the summer or fall months, such a minor ailment should not be dismissed without a second thought. Well over 90 per cent of patients

recover completely from such minor ailments, which may have no connection with poliomyelitis.

Almost all patients in whom recognizable infantile paralysis develops give this history of systemic illness. Trask and Blade were able to demonstrate the presence of the virus in contacts who were only mildly ill. In those who do not recover from the mild form, the second or preparalytic stage follows immediately after the initial illness. Very often there is a period of latency of one or more days, during which the patient apparently is well, before the disease resumes its course. After the patient has clinically recovered observation should be maintained for signs of reappearance of the infection. The second stage is characterized by symptoms and signs indicative of involvement of the central nervous system. The duration of the period is from one to four days. In most instances, there will be enough findings so that the physician on the alert for this disease will have grounds to suspect its presence. At this stage a spinal puncture should be done and can be expected to confirm the diagnosis.

In the last two years 65 cases were seen in which there were grounds to suspect poliomyelitis but in which some condition other than poliomyelitis could be definitely established. The condition most often suspected of being poliomyelitis is acute encephalitis.

Dr. Levinson believes that it is no grave mistake to suspect poliomyelitis in the conditions which he enumerates. Much more grave are the consequences if poliomyelitis is overlooked.

Until the last two years, all patients who were seen in the preparalytic stage were treated with convalescent serum intraspinally and intravenously. In the last two years the dose has been increased. Now patients who are clinically in the preparalytic stage of poliomyelitis but whose spinal fluid shows no increased cell count receive the entire dose of serum, which is introduced only by the intravenous route. The preparalytic series treated with serum comprises 149 persons. Of this number, 92 showed no evidence of muscle weakness; 41 had temporary weakness, 10 showed mild residual weakness; 4 suffered moderate permanent paralysis.

If the serum is of value in the treatment of the disease, it cannot be withheld from any patient who is acutely ill, even though paralysis already has occurred. Levinson feels that patients acutely sick must be given convalescent serum for its possible effect in checking the advance of the disease.

In a group of 50 patients with encephalobulbar involvement who were still acutely sick when first seen and who consequently were treated with serum, there was a mortality of 42 per cent. This is a relatively low figure.

Following the administration of serum the patient is carefully observed, and if there is evidence that the disease has not been arrested, a second dose is administered intravenously.

BARBOUR, Peoria, Ill.

ACTIVE IMMUNIZATION AGAINST POLIOMYELITIS. A COMPARATIVE STUDY: I. ATTEMPTS AT IMMUNIZATION OF MONKEYS AND CHILDREN WITH FORMALIZED VIRUS. S. D. KRAMER, J. Immunol. **31**:167 (Sept.) 1936.

Kramer has investigated the possibility of producing active immunity against poliomyelitis by vaccination with formaldehydized virus as employed by Brodie. Observations on monkeys and children failed to confirm Brodie's claims for this procedure.

Two series of monkeys were employed, one vaccinated with 5 cc. of 10 per cent cord suspension, the other with 10 cc. of a similar suspension. The virus used was rendered noninfective by treatment with a 0.1 per cent dilution of solution of formaldehyde U. S. P. The majority of these animals succumbed to intracerebral injection of 0.01 cc. of a 5 per cent suspension of active virus—an amount slightly less than a minimal constantly infective dose.

Observations were made on two groups of children. In one group each child was inoculated with 5 cc. of formaldehydized virus. The serum of 50 per cent of the children in this group contained neutralizing substance at from one to two months after vaccination. The other group was a control group of nonimmune children (as indicated by the absence of neutralizing substance in their serums at

the beginning of the observations). The children of the control group were tested again from one to three months later. Although they had not been vaccinated, 41 per cent had acquired neutralizing substance in their serums during this time. Kramer points out that the difference between this group and the vaccinated group is not significant.

FOTHERGILL, Boston.

ACTIVE IMMUNIZATION AGAINST POLIOMYELITIS. A COMPARATIVE STUDY: II. EXPERIMENTAL IMMUNIZATION OF MONKEYS WITH VIRUS TREATED WITH SODIUM RICINOLEATE. S. D. KRAMER and L. H. GROSSMAN, J. Immunol. **31**:183 (Sept.) 1936.

No evidence was obtained that sodium ricinoleate attenuated the virus of poliomyelitis as claimed by Kolmer. The virus thus treated possessed essentially the same infectivity as the untreated virus.

Each of thirty monkeys was vaccinated by five subcutaneous inoculations of ricinoleated virus at weekly intervals. In the serums of sixteen sufficient neutralizing substance developed to neutralize a single constantly infective dose of virus. However, all but two animals succumbed to intracerebral inoculation of the same dose of virus.

FOTHERGILL, Boston.

ACTIVE IMMUNIZATION AGAINST POLIOMYELITIS. A COMPARATIVE STUDY: III. ACTIVE IMMUNIZATION OF MONKEYS WITH EXACTLY NEUTRALIZED MIXTURES OF VIRUS AND SERUM. S. D. KRAMER, J. Immunol. **31**:191 (Sept.) 1936.

Evidence was obtained that some immunity followed vaccination of monkeys with virus neutralized with immune serum, although, as Kramer states, "they could not be said to have possessed a solid immunity, comparable to animals who had recovered from a severe crippling attack of the disease." Such neutralized mixtures proved noninfective on subcutaneous and on intracerebral inoculation.

FOTHERGILL, Boston.

ACTIVE IMMUNIZATION AGAINST POLIOMYELITIS. A COMPARATIVE STUDY: IV. EXPERIMENTAL IMMUNIZATION OF MONKEYS WITH PURIFIED VIRUS, ADSORBED ON $Al(OH)_3$. S. D. KRAMER, L. H. GROSSMAN and B. HOSKWITH, J. Immunol. **31**:199 (Sept.) 1936.

Vaccination with partially purified virus adsorbed on aluminum hydroxide gel was more successful than vaccination by any of the several other methods studied. A greater percentage of animals gained more solid immunity. A detailed description of the method for adsorbing virus is given.

None of the test animals treated subcutaneously presented symptoms suggestive of experimental poliomyelitis. Test animals succumbed to the disease, however, when small doses of the gel containing adsorbed virus were injected intracerebrally.

FOTHERGILL, Boston.

REPORTING PARALYTIC AND NONPARALYTIC POLIOMYELITIS. Pub. Health Rep. **51**:1556 (Nov. 6) 1936.

On account of the variability, as well as the uncertainty of recognition, of cases of poliomyelitis, it is believed that, for recording and comparing the intensity of the spread of poliomyelitis, only cases in which paralysis develops should be counted. When this distinction is possible, it will be made in the *Public Health Reports*. Any notable number of cases in which paralysis fails to appear will be reported separately.

SANFORD, Chicago.

COMPLEMENT FIXATION WITH VACCINIAL ELEMENTARY BODY SUSPENSIONS AND ANTIVACCINIAL RABBIT SERUM. M. H. FINLAYSON, Brit. J. Exper. Path. **16**: 358, 1935.

Suspensions of the elementary bodies of the virus of vaccinia fix complement in vaccinial hyperimmune rabbit serums. The complement-fixing activity is reduced

but not abolished by filtration through Berkefeld V and N filters and through graded collodion membranes of a pore size of 0.15 millimicron. The complement-fixing activity is removed by centrifugation of the suspensions at high speeds. The antigenic activity is retained in the resuspended deposit of the elementary bodies.

FROM THE AUTHOR'S SUMMARY. [ARCH. PATH.]

TRANSMISSION OF MEASLES TO RABBITS. LEWIS PARÉ, Union méd. du Canada **65**:10 (Jan.) 1936.

In a preliminary report, Paré reports successful transmission of measles to rabbits, with three passages through rabbits' blood obtained by using cardiac puncture.

DAFFINEE, Boston.

SURGICAL INTERVENTION IN A CASE OF CHICKENPOX WITH CEREBRAL HYPERTENSION AND CEREBELLAR SYMPTOMS. J. SAUCIER, Union méd. du Canada **65**:229 (March) 1936.

A boy of 8 began to suffer from headache and ataxia five or six days after disappearance of a chickenpox rash. He showed the cerebellar syndrome—ataxic quadriplegia, adiadokokinesis, hypotonia, nystagmus and incoordination. There were no sensory changes and no neuronal changes. The cranial nerves were intact except that the vestibular apparatus was disturbed and papilledema was present. Lumbar puncture showed a pressure of 250 mm. of water, with 7 lymphocytes and a normal amount of protein. The cerebellar symptoms became rapidly worse, and surgical intervention was advised, largely on the basis of the papilledema. Suboccipital craniotomy disclosed adhesions obstructing the retrobulbar region, with arachnoidal cysts. These were broken up, and the dura was closed without drains. The child progressed satisfactorily and was discharged a month afterward. Saucier defends surgical intervention in such cases.

DAFFINEE, Boston.

EXPERIMENTAL DIPHTHERIC PARALYSIS. G. RUELLE, Ann. Inst. Pasteur **54**:185, 1935.

Injection of modified diphtheria toxin into the muscles of guinea-pigs induced paralysis, the evolution and intensity of which were influenced by the quantity of toxin used. Antitoxin could be demonstrated in the blood, and it thus appeared that the toxin was fixed by the nervous system before sufficient antitoxin was produced to neutralize it. Antitoxin produced later did not affect the development of paralysis. These observations are in accord with reports of cases of paralysis apparently following unrecognized diphtheria. Although such patients have abnormal quantities of antitoxin, the origin of the condition may still reasonably be diphtheria.

MARSHALL, San Francisco. [ARCH. PATH.]

CLINICAL AND THERAPEUTIC CONSIDERATIONS OF CEREBROSPINAL MENINGITIS IN CHILDHOOD. J. S. WEINER and S. F. BACCAL, Arch. de méd. d. enf. **39**:642 (Oct.) 1936.

The pandemic of cerebrospinal meningitis that affected the children of Odessa, U. S. S. R., in 1931-1932 is discussed by these members of the staff at the Institute of Medicine.

Ninety children were under treatment, 50 per cent of whom were under 2 years of age. The mortality rate in this group for 1931 was 50, and that for 1932 was 39.3. The authors noted an increase in morbidity and mortality during the colder months. Among the etiologic factors, trauma, especially that due to falls, was noted in six cases.

An extended review of the clinical findings (type of onset, constitutional response, duration of the infection and laboratory data) is added to the statistical report.

Dissatisfied with results in the administration of polyvalent antimeningococcus serum during previous epidemics, the authors divided the patients into three groups;

those in the first group were treated in the conventional way—spinal punctures followed by the introduction of serum; the second group received spinal drainage alone, while the third was treated with its own cerebrospinal fluids.

The average quantity of serum given in 1931 was from 175 to 200 cc., of which from 50 to 75 cc. was administered by the lumbar route and from 75 to 125 cc. intramuscularly. In 1932, these amounts were considerably increased. At this time, also, the practice of injecting, with each spinal drainage, from 3 to 5 cc. of the spinal fluid, regardless of its character, was adopted. These injections were made intramuscularly and subcutaneously in alternation. This method may be regarded as autovaccination sui generis, since the patient receives, with the cerebrospinal fluid, antigens of the antibodies the specificity of which is beyond question. In addition, there is the beneficial effect to be expected from protein therapy.

The results of this experiment are interesting, but in drawing comparisons between the epidemics of 1931 and 1932 the writers concede that the latter was much less violent.

In the patients given the usual serum treatment the mortality was lower than in those treated simply by spinal puncture. This difference, however, amounted to only 11.6 per cent in 1931 and 5.8 per cent in 1932. It was only in the cases in which the condition was grave that even this inequality was observed.

All of the children treated with their own spinal fluids, eleven in number, were under 2 years of age, but notwithstanding this the mortality rate, 27.2 per cent, was the lowest among the three groups. Because of the small number of cases, no opinion is offered, but further studies in this field will be undertaken.

AMESSE, Denver.

CAN INFANTILE PARALYSIS BE PREVENTED? JEAN SAUCIER, Bull. Assoc. internat. de pédiat. prevent. **3**:3, 1936.

Reviewing the more promising investigations in this field during the past few years, Saucier concludes that there is no certain method of preventing poliomyelitis. It seems obvious, however, that the virus enters the body through the mucous lining of the nose. None of the vaccines hitherto offered is dependable; the faith of the clinician is now pinned on adult blood and especially on pooled serum, which may be dried and stored for use in epidemics.

The use of some preparation of alum as an astringent nasal spray is an interesting and logical prophylactic procedure now being subjected to intensive study.

AMESSE, Denver.

FATAL DIPHTHERIA IN A MOTHER AND NEW-BORN INFANT. VORON, LYONNET and CONTAMIN, Bull. Soc. d'obst. et de gynéc. **25**:83 (Jan.) 1936.

Voron, Lyonnet and Contamin report the case of a woman 35 years of age, a nonipara, who was brought to the hospital the day after delivery of a girl weighing 3,050 Gm. The history was that she had been suffering from what was called grip for a few days prior to the delivery, which appeared to cause an exacerbation of this condition. She died shortly after admission. The principal changes noted at necropsy were a pleural effusion on the right side and a diphtheritic membrane, confirmed by culture and histologic section, involving the trachea and the major and minor bronchi. The new-born infant, who had not been in contact with her mother since birth, was transferred to a nursery before the necropsy findings were known. It was noted that she had an ulceration of the umbilicus, covered with a false membrane, bilateral otitis media and coryza. This was twelve hours after birth. Cultures of material from the umbilical lesions and the nose were positive for the Klebs-Löffler bacillus. Despite serotherapy the infant died eighteen hours after birth. In a brief review of the literature the author states that from 12 to 13 per cent of the new-born are diphtheria carriers and that diphtheria of the new-born is not as rare as is commonly supposed. It is usually overlooked because the possibility of its presence is not considered. When the

mother has diphtheria, the infant contracts the disease in 65 per cent of cases. The authors believe that the infants become infected not through the placental circulation but by contact with the contaminated or infected genital secretions of the mother or from the secretions of the rhinopharynx when the infant is first put to the breast.

GLASER, Rochester, N. Y.

COMPLICATIONS OF MUMPS IN CHILDREN. VLADIMIR MIKULOWSKI, Paris méd. **2**:301 (Oct. 31) 1936.

Mikulowski reports a case of mumps in a girl 2 years of age, in which the glandular swelling involved the submaxillary rather than the parotid glands. The course was complicated by panophthalmitis and meningitis. The child recovered.

LESLIE, Evanston, Ill.

CLINICAL, STATISTICAL AND EPIDEMIOLOGICAL ANALYSIS OF NINE THOUSAND CASES OF DIPHTHERIA OBSERVED IN HOSPITALS IN MILAN, ITALY, BETWEEN 1905 and 1932. W. SCHWARZ and G. FACHINI, Arch. ital. di pediat. **3**:259, 1935.

The following significant points were revealed:

1. Diphtheria morbidity shows a periodicity over a period of years. In 1926 an epidemic wave started in Italy which persists to the present time in Milan and which has carried morbidity figures to the highest point since 1896.

2. In the period under consideration mortality figures for diphtheria have varied between certain restricted highs and lows, with an average of 9.3 per cent, and during the recent epidemic the highest mortality was 8.4 per cent, or nearly as high as in 1931. The present epidemic cannot be considered, then, as very malignant.

3. In Milan the percentage of patients with diphtheria recovering in hospitals is between 55 and 68. In the last decade one notes a higher proportion of hospitalization of the more seriously ill patients, shown by the higher percentage of mortality of diphtheritic patients in hospitals as compared with the percentage of mortality of those at home.

4. From the standpoint of the frequency of development of complications, the diphtheria in the present epidemic could be classified as malignant.

5. On the whole the two sexes are involved with equal frequency. Males are involved more in the first year of life, while females are involved in the ninth year more than in other years. The present epidemic has touched children of school age and adolescents, girls being affected particularly in their teens. The epidemic of 1905-1909 fell among children under 4 years of age, with a prevalence among males. Nasal and laryngeal localization is more frequent in the male sex, and pharyngeal, in the female sex.

6. Of the various sites for localization, the nose and larynx are involved the most frequently and the most seriously in persons under 1 year of age. Multiple localization (rhinopharyngeal and rhinolaryngopharyngeal) shows about the same frequency at the various ages and is always associated with increase in mortality. The purely pharyngeal form is associated with the lowest mortality and appears with greater frequency with increasing age. The fact that the purely pharyngeal form is the most frequent explains why the world mortality from this disease is relatively low.

7. Laryngeal localization is becoming much rarer, occurring in from 25 to 33 per cent in 1905-1912 and in from 4 to 9 per cent in 1926-1932. There were peaks for frequency of rhinopharyngeal localization in 1925 and in 1930.

8. Among the causes of death, diphtheritic toxemia occurs with greater frequency in older children, while bronchopneumonia is seen less often in older children. The cause of death in adults depends on the course in childhood.

9. High dosages of serum did not lower mortality generally and did not prevent a small rise in 1931. The mortality in the more serious cases appears

now to be somewhat lower in comparison with that of last year, following lower dosages. For all groups of ages and for all types of localization, the patients treated with the highest dosages, in proportion with the gravity of the involvement, showed the greatest mortality.

10. The increase in mortality seen when there is a delay in the use of serum is about the same in the various age groups.

11. In patients with laryngeal diphtheria who have been intubated but not otherwise operated on the mortality is always much higher, especially in those who have been tracheotomized. The cause of death in intubated patients is bronchopneumonia in 64 per cent of the cases.

12. Cardiac and nervous complications are more frequent in older children. Renal complications do not increase in frequency with age. Purulent otitis decreases in frequency with age. Rhinopharyngeal localization of malignant or toxic diphtheria produces cardiac and nervous complications in a high percentage of the cases. The mortality in cases complicated by myocarditis is around 50 per cent; it is greatest—76 per cent—in the second and fourth years.

13. The most frequent type of postdiphtheritic paralysis has been that of the soft palate (68 per cent). Next in frequency are paralyses of the extremities (13 per cent), occurring mostly in the younger children. Paralysis of the soft palate is seen more in older children. Delay in administration of serum did not increase the incidence of postdiphtheritic paralyses.

14. One sees a variety of exanthems following serum therapy each year. Serum reactions were much more frequent in 1924 than in other years; possibly they were related to the use of large doses. Serum reactions appear with greatest frequency on the seventh and tenth days following the injection of serum.

15. The scarlatiniform exanthem is second in frequency to the urticarial exanthem. It appears with greatest prevalence on the third and seventh days after the first injection of serum. It was not possible to establish any relation between scarlatiniform exanthems and the current mortality from scarlet fever in Milan, the index of correlation between the two being 0.5. On the other hand, the index of correlation between the frequency of scarlatiniform exanthems and that of diphtheria, on the one hand, and the frequency of serum reactions, on the other, came close to unity. Statistically, at least, the scarlatiniform exanthem should be considered as a manifestation of serum sickness and not of scarlet fever.

16. The morbidity and deadliness of diphtheria show a seasonal rhythm, with highs and lows of varying amplitude, as shown by its three principal phenomena, and are characterized by maximums in autumn and winter and minimums in summer. As to morbidity, it is more evident in the fourth year of age than in succeeding years. As to toxemia, the principal cause of death, it does not show a seasonal rhythm such as is seen markedly in bronchopneumonia and descending diphtheria. The frequency of serum reactions is less in summer. From the seasonal curves it does not seem possible to attribute any importance to the prevalence of any extrinsic factor such as the school calendar or the winter crowding in schools.

DOOLEY, New York.

POSTDIPHTHERITIC HEMIPLEGIA TERMINATING IN DEATH. E. S. YANNUZZI, Arch. de pediat. d. Uruguay **7**:190 (May) 1936.

Two cases are presented in which hemiplegia followed an attack of diphtheria; death resulted in both instances. The first patient, a boy 10 years old, presented complete left hemiplegia fourteen days after a severe attack of pharyngeal diphtheria, which had been treated with 310 cc. of serum. He died within a few hours. The second, a girl of 6 years, had severe pharyngeal diphtheria, with a convulsive seizure and left hemiplegia. She also had received serum treatment but died the day following the onset of hemiplegia. Autopsy revealed no emboli, thrombi or areas of softening in the brain. There was congestion of the pial vessels with punctate hemorrhages.

SCHLUTZ, Chicago.

HYPERACUTE DIPHTHERITIC ENCEPHALITIS. E. PELUFFO and O. V. RAGGIO, Arch. de pediat. d. Uruguay **7**:203 (May) 1936.

Peluffo and Raggio present the case of a 7 year old girl who came to the hospital with vague manifestations of an infectious disease, which had their onset twenty-four hours previously and progressed abruptly to a series of convulsions. Examination revealed the presence of a diphtheritic lesion in the pharynx, the Klebs-Löffler bacillus being demonstrated in the smear and in the culture. The patient died within twenty-four hours after admission; she presented typical acute encephalitis with a terminal status of convulsion. Necropsy demonstrated the presence of hemorrhagic meningo-encephalitis and of membranous angina of diphtheritic appearance. The authors point out the extreme rarity of the case, which was the only one recorded in the hospital.

SCHLUTZ, Chicago.

DIPHTHERIA BACILLUS CARRIERS. M. KAISER and A. LODE, Arch. f. Kinderh. **107**:40, 1935.

Biweekly examination of the pupils in school room classes for diphtheria bacilli over a long period (up to two years) showed that extraordinarily many children carried bacilli temporarily. In two classes in Linz, Austria, about 30 per cent, and in a class in Innsbruck, Austria, only 2 per cent, of the children remained continuously free from diphtheria bacilli, although in the two classes in Linz no child had diphtheria during the period of observation, and in Innsbruck the cases of diphtheria occurred during a period of decline in the number of carriers. The value of examination for diphtheria bacilli in well persons is much lessened by these results.

CRANE, Chicago. [FROM THE AUTHOR'S SUMMARY.]

EXTENSIVE PULMONARY ATELECTASIS DURING THE PARALYTIC STAGE OF DIPHTHERIA. R. POHL and H. ZISCHINSKY, Jahrb. f. Kinderh. **145**:66 (Aug.) 1935.

An 11 year old boy with diphtheria presented polyneuritis during the sixth week of his illness. Improvement began and continued until the tenth week after the onset of his illness, when paralysis of the throat and esophageal musculature developed. There were difficulties in swallowing at this time. Aspirated small food particles were considered to be a contributing factor in the massive atelectasis which occurred on the right side. The patient recovered. References to the earlier literature concerning changes in the lungs in diphtheria are mentioned.

LANDAU, Hannibal, Mo.

IS BACILLUS PERTUSSIS VACCINE EFFECTIVE AGAINST WHOOPING COUGH? R. JARISCH, Jahrb. f. Kinderh. **145**:73 (Aug.) 1935.

Petein (an emulsion of whooping cough germs) was given four times either subcutaneously or intramuscularly to children from 3 months to 7 years of age who had pertussis. The series was carefully controlled. The preparation was not found to have any virtues as a therapeutic agent.

LANDAU, Hannibal, Mo.

MEASLES AND KERATOMALACIA. Y. HIRO and M. YAMADA, Monatschr. f. Kinderh. **65**:438 (May) 1936.

In five years Hiro and Yamada observed forty-six patients with keratomalacia in Japan. In nine instances (20 per cent) it occurred during measles. In six of the latter it developed during the course of a bronchopneumonia. The condition developed from one to four weeks after the appearance of the exanthem.

They ascribe the complication to an increased use of vitamin A necessitated by the infection, plus a decreased intake because of the anorexia.

GERSTLEY, Chicago.

PROPHYLAXIS OF MEASLES WITH PLACENTAL EXTRACT. H. G. HUBER, Monatschr. f. Kinderh. **65**:446 (May) 1936.

In doses of 10, 15 and 20 cc. a certain preparation of placental extract gave protection against measles equal to that of convalescent serum. Huber expresses the belief that this new preparation will be a valuable asset in pediatrics.

GERSTLEY, Chicago.

KORSAKOFF'S PSYCHOSIS COMPLICATING PHARYNGEAL DIPHTHERIA. GERTRUD ZIMMERMANN, Monatschr. f. Kinderh. **66**:4 (June) 1936.

In the fifth week following pharyngeal diphtheria in a 9 year old boy, paralysis of the throat muscles as well as cardiac weakness developed. These complications reached their height during the seventh week, at which time the mental symptoms of the Korsakoff psychosis developed. The condition lasted five days, after which there was spontaneous recovery.

GERSTLEY, Chicago.

SINO-AURICULAR BLOCK IN DIPHTHERIA. PAUL VON KISS, Monatschr. f. Kinderh. **66**:30 (June) 1936.

In the course of ten years' experience with the cardiac complications of diphtheria, von Kiss has noted only one instance of sino-auricular block. This occurred in a 5 year old girl, who had been sick one day before receiving 30,000 units of antitoxin. The following day she was given 40,000 units. The membrane disappeared at the end of the first week, although albuminuria was present for three weeks. On the seventh day arrhythmia was noticed. The electrocardiogram showed it to be sino-auricular block. The writer submits a clinical chart and three electrocardiograms.

GERSTLEY, Chicago.

TOXEMIA LATE IN CONVALESCENCE FROM SCARLET FEVER. H. ZISCHINSKY, München. med. Wchnschr. **83**:1165 (July 17) 1936.

Zischinsky describes acute severe toxemia observed during the fourth or fifth week of convalescence in 3 of 15,000 cases of scarlet fever. Two of the patients had mild scarlet fever and one a moderately severe onset. One patient had acute arthritis; another, cervical adenitis, which subsided. The third patient, a boy 2 years of age, had a congenital cardiac condition. He had no complications until the fifth week, when he suddenly became sick with vomiting, abdominal distention, pallor, restlessness and a temperature of 40.1 C. (104.2 F.). This was followed in a few hours by collapse, convulsions and death. Autopsy revealed aortic stenosis, fatty degeneration of the myocardium, subendocardial and pericardial petechiae, edema and fatty infiltration of the liver and kidneys, congestion of the spleen, hypoplasia of the adrenal glands and edema of the brain.

The second patient was a 5 year old boy who was apparently doing well until the fourth week of convalescence, when suddenly severe toxemia developed. The pulse rate was 200; there was marked dyspnea, and the breath had a strong acetone odor. The child rapidly became worse, the temperature rose to 38.2 C. (100.7 F.), and he died the same evening. Autopsy revealed acute gastritis, enteritis and colitis, manifested by hyperemia, small hemorrhages into the mucosa and swelling of Peyer's patches; terminal pulmonary edema and purulent bronchiolitis of the lower lobe of the left lung; subchronic splenic tumor; fatty degeneration of the liver and kidneys, and edema of the brain. The gastro-intestinal changes were interpreted as results rather than the cause of the intoxication.

The other patient was a 4 year old girl who had a similar episode during the fifth week of convalescence but survived.

Zischinsky has no satisfactory explanation for the occurrence of this condition, but he believes it is definitely related to the scarlet fever. It has not been observed in other acute infectious diseases. It may be a late toxic effect such as occurs with other manifestations following diphtheria. The condition occurs at a time corresponding to the second illness of scarlet fever described by Pospischill and Weiss.

BRAHDY, Mount Vernon, N. Y.

EXPERIMENTS IN TREATMENT OF DIPHTHERIA. ALFRED EBEL and HANS MAUTNER. Wien. klin. Wchnschr. **49**:464 (April 10) 1936.

Alfred Ebel and Hans Mautner attempted to determine the effect of medicaments on diphtheria toxicosis in guinea-pigs. First, they tried to find out whether insulin or insulin and dextrose could prevent toxic changes in the heart muscle. Histologic investigation showed that the hearts of animals which had received insulin contained more glycogen and less fat than the hearts of the other animals. However, guinea-pigs which had received injections of insulin died sooner than the others. The authors explain this latter observation by the harmful effect of insulin on the adrenal glands.

Preparations of the adrenal cortex have recently been tried with good effect in numerous infectious diseases. Such preparations do not seem to be effective in diphtheria unless combined with cevitamic acid (crystalline vitamin C). Ebel and Mautner injected a minimal lethal dose of diphtheria toxin into guinea-pigs, and on the following day administered subcutaneously approximately equal doses of adrenal cortex extract and cevitamic acid. Animals thus treated lived. Extract of the adrenal cortex alone or cevitamic acid alone did not seem to be effective. The authors believe that cevitamic acid prevents the decomposition of the extract and that the extract has a favorable influence on the fixation of glycogen in the heart.

Some medicaments accentuate the effect of the diphtheria toxin and others reduce the effect. Ebel and Mautner recommend that insulin and hypertonic solutions of other substances be avoided, especially during the first few days of the illness. Isotonic solutions of sugar given orally or rectally seem to be beneficial when the disease is subsiding. Preparations of the adrenal cortex in combination with cevitamic acid are recommended in all cases in which severe diphtheria threatens to develop.

ABT, Chicago.

PROPHYLAXIS AND THERAPY OF INFECTIOUS DISEASES OF CHILDHOOD. HERBERT OREL, Wien. klin. Wchnschr. **49**:584 (May 8) 1936.

Orel says that in the last few decades a few infectious diseases, such as cholera and typhus, have been practically wiped out. Kisskalt designated them as diseases which result from an uncivilized state. Measles, whooping cough, diphtheria, scarlet fever and a few other infectious illnesses persist in endemic or even in epidemic form. The thicker the population, the greater is the chance of infection. Degkwitz has designated such infections as diseases of civilization.

Prior to the rise of bacteriology the treatment was purely symptomatic. Now treatment aims to get at the cause of the disease. Prevention is even more important than therapy. Infectious disease can be prevented in one of two ways: (1) by what the author calls "exposition-prophylaxis," which consists in protection by detoxication of the bacilli or by quarantine measures and (2) by "disposition-prophylaxis," which is prevention of the outbreak of the illness, even though the bacilli are present, by individual hygienic and immunobiologic measures. Both modes of prophylaxis are abundantly used. Different methods are employed, depending on the danger and frequency of occurrence of the illness, the biologic characteristics of the bacillus and the susceptibility of the patient. Other circumstances must be considered: for example, the vocation of persons with whom the patient comes in contact.

Early recognition of the disease, especially of the first few cases, is the basis of exposition-prophylaxis. For various reasons the diagnosis is often made too late. The patient may fail to seek the services of a physician or may call him only at the height of the illness. Such diseases as measles and whooping cough are especially contagious at a time when they are not easily diagnosed. When the presence of infectious disease has been established, the patient is quarantined. In order that quarantine measures may be effective, the authorities, physicians and lay public must cooperate.

Disposition-prophylaxis consists, first of all, in breast feeding during the first year of life. It is well known that breast-fed infants offer more resistance to

infection than artificially fed infants and that they retain their natural immunity for a longer period. The earlier the infection occurs after natural immunity is lost, the more unfavorable is the prognosis. Immunobiologic measures aim at immunization of persons who are threatened with infection or have already become infected. Reconvalescent serum has a passive action. Serum made from bacteria which have been killed or recovery from a mild attack of the disease provides active immunization. Reconvalescent serum or adult serum has the advantage over serum obtained from animals in that it does not cause serum illness and produces immunity which lasts for a longer period. On the other hand, human serum is more difficult to prepare and has a lower antibody content.

A study of measles will illustrate some of these points. Measles is usually considered a harmless disease, but it is dangerous if it occurs in rachitic infants or in those suffering from tuberculosis. The economic status of the family is important. In overcrowded quarters children suffering from measles are especially susceptible to secondary infections. Degkwitz has worked out a method of protection against the disease which is effective if applied at the right time, that is, in the first four days of the period of incubation. Up to that time from 4 to 8 cc. of mixed convalescent serum is effective. If smaller amounts of serum are administered or if it is injected after the fourth day, measles will occur in mild form after a prolonged period of incubation.

If convalescent serum cannot be obtained, serum or blood from adults who have had measles may be used. The serum of the parents is the best, although it does not contain so many antibodies, and large doses are therefore necessary. Knauer recommended serum of adults who have been in constant contact with patients suffering from measles. The presence of the virus leads to increased antibody production. The reactivation of reconvalescent serum by the injection of blood of patients suffering from measles is based on the same principle.

ABT, Chicago.

IMMUNIZATION AGAINST DIPHTHERIA WITH ONE DOSE OF PRECIPITATED ANATOXIN. M. ISABOLINSKI, W. JUDENITSCH and I. LEWZOW, Ztschr. f. Immunitätsforsch. u. exper. Therap. **85**:218, 1935.

Guinea-pigs given a single injection of diphtheria anatoxin precipitated with a 1 per cent solution of alum or with aluminum hydroxide or iron hydroxide showed within two months high resistance to diphtheria toxin and a rise of the blood antitoxin. In 60 per cent of the animals small indurations of the skin developed at the sites of injection. They disappeared in from five to seven days. Dissolving the alum-precipitated anatoxin with potassium hydroxide yielded a product of still greater antigenic efficiency. The results of all the experiments were checked by inoculating untreated anatoxin. The alum-precipitated anatoxin was used in 245 children. In 96.8 per cent of them the positive reaction to the Schick test became negative within forty-five days. No bad effects were noted.

DAVIDSOHN, Chicago. [ARCH. PATH.]

IMMUNIZATION BY MEANS OF DIPHTHERIA ANATOXIN (RAMON) MIXED WITH ALUMINUM HYDROXIDE. S. SCHMIDT, C. JENSEN and I. FJORD-NIELSEN, Ztschr. f. Immunitätsforsch. u. exper. Therap. **85**:276, 1935.

Rabbits were successfully immunized against diphtheria toxin by a single injection of a small amount of purified and concentrated toxoid to which aluminum hydroxide was added in the concentration of 10 per cent. Four weeks later the majority of the animals stood an intravenous injection of ten times the dose of diphtheria toxin that was fatal to untreated rabbits. The same procedure was used successfully in immunizing about 15,000 children in Denmark and Ireland, without any untoward complications. The technic of preparation is described.

DAVIDSOHN, Chicago. [ARCH. PATH.]

NORMAL DIPHTHERIA ANTITOXIN. S. ZURUKZOGLU and O. MÜNDEL, Ztschr. f. Immunitätsforsch. u. exper. Therap. **85**:314, 1935.

Cultures were made from the nares and on occasion from the throats and tonsils of 100 horses of various ages. From one horse a typical diphtheria bacillus was isolated, and from another a bacillus that had the tinctorial and cultural properties of the diphtheria bacillus but was not virulent for the guinea-pig. While no definite conclusions are permissible, the results indicate that the possibility of a specific causation for the diphtheria antitoxin in horses cannot be denied.

DAVIDSOHN, Chicago. [ARCH. PATH.]

THE VARIOUS STAGES OF PERTUSSIS FROM THE HEMATOLOGIC STANDPOINT AND THE SO-CALLED WHOOPING COUGH RELAPSES. I. INABA, Ztschr. f. Kinderh. **55**:677, 1933.

According to Inaba, the lymphocytosis present with whooping cough is an expression of the biologic reaction of the organism to the Bordet-Gengou bacillus.

The variations in the absolute number of lymphocytes during the course of uncomplicated whooping cough parallel the attacks of coughing. The lymphocyte count is valuable not only for the diagnosis of pertussis but also for the determination of the stage of the disease.

He believes that true recurrent whooping cough has never been demonstrated. The condition represented to be this is usually a recurrence of attacks of coughing caused by various nonspecific factors.

LEVINSON, Chicago.

THE DIAGNOSTIC VALUE OF HYPERLYMPHOCYTOSIS IN WHOOPING COUGH. I. INABA and H. SAITO, Ztschr. f. Kinderh. **56**:345 (May 24) 1934.

The upper limits of the lymphocyte counts for normal infants and children of various ages were determined, and formulas for determining the relation of a given lymphocyte count to the normal (for the first, second, third, fourth to seventh and seventh years and older) were constructed. The formulas were found to be accurate in the diagnosis of whooping cough to the extent of 68 per cent during the catarrhal stage, 86 per cent during the spasmodic stage and 49 per cent during the stage of decline.

SIEMSEN, Chicago.

THE SCHICK REACTION AND ITS EFFECT ON THE ANTITOXIN CONTENT OF BLOOD. F. BLAŽEK, Časop. lék. česk. **72**:553 (May 5) 1933.

Finding that some of the children tested had an appreciable titer of antitoxin three weeks after Schick testing, Blažek feels that in evaluating the efficiency of various materials used in immunization the titer of the antitoxin in the blood rather than the result of the Schick test should be the criterion.

STULIK, Chicago.

THE PAVLOVIČ REACTION IN ACUTE ANTERIOR POLIOMYELITIS. B. VRÁNOVÁ, Časop. lék. česk. **72**:693 (June 2) 1933.

In twelve of twenty cases of poliomyelitis the Pavlovič test was negative early but became positive in the later stages. Since the test is positive in basilar purulent and serous meningitis, Vránová thinks that the early negative test, together with a normal content of chlorides and a normal or increased content of sugar in the spinal fluid, may be valuable in the early diagnosis and treatment of poliomyelitis. The test consists in dropping several drops of spinal fluid into a solution made up of 100 cc. of distilled water, 6 drops of glacial acetic acid and 4 cc. of 10 per cent potassium ferrocyanide. In a positive test the first drop of spinal fluid shows a cloudy trail as it enters into the solution. In the negative reaction a slight clouding, which quickly disappears, forms only after the third to fifth drop.

STULIK, Chicago.

TWO CASES OF ACCIDENTAL VACCINATION WITH VACCINAL LYMPH. F. KOZA, Časop. lék. česk. **72**:713 (June 9) 1933.

A mother aspirated vaccine from the site of vaccination of her child, and massive indurated lesions of the lips and mouth developed where the vaccine was associated with old pyorrhea. A boy aspirated lymph from a discarded capillary tube, and massive lesions of the lower lip developed, the course of which was synchronous with that of a typical lesion at the site of vaccination on the arm.

STULIK, Chicago.

THE WASSERMANN REACTION IN SCARLET FEVER. E. WEICHHERZ, Časop. lék. česk. **72**:1299 (Oct. 27) 1933.

To verify the work of Montevelli, who reported 364 scarlatinal serums with no positive Wassermann reaction, Weichherz tested 100 scarlatinal serums. The Wassermann test was negative in all except 2, in which a precipitin reaction without hemolysis took place. These two serums were from persons who had a history of congenital syphilis.

STULIK, Chicago.

ANAEROBIC BACILLI IN MALIGNANT DIPHTHERIA. A. DOSKOČIL, Časop. lék. česk. **72**:1730 (Dec. 15) 1933.

Doskočil reports two cases of malignant diphtheria that terminated fatally despite massive doses of antitoxin. Cultures from the membranes revealed anaerobic bacilli with proteolytic and saccharolytic properties. He recommends a diet including foods which tend to inhibit anaerobic growth, as lactic acid-containing material, together with anaerobic antitoxin. The commercial antitoxin is recommended in spite of the fact that both the antitoxin and the antigangrene serum contain the antibodies of only some of the organisms involved.

STULIK, Chicago.

A CONTRIBUTION TO THE EPIDEMIOLOGY OF DIPHTHERIA. V. MUCHA and J. HOCK, Časop. lék. česk. **73**:484 (May 4) 1934.

Mucha and Hock found that 25 per cent of the children and adults in an orphanage were diphtheria carriers. Other authors report as many as 67 per cent carriers in the orphans, the nursing staff and the contacts. The authors found that, of thirteen carriers among the children, twelve had organisms that were pathogenic according to the guinea-pig inoculations. They feel that an epidemic of diphtheria can be controlled by finding and isolating the carriers. Carriers are divided into short term and long term carriers. The short term carriers show negative reactions in from two to three weeks after instillation of 2 per cent silver nitrate, and there are no gross changes in the nasopharynx. The long term carriers have some pathologic changes in the nasopharynx, usually including enlargement of the tonsils, and these changes often persist over eight weeks in spite of treatment. The chronic or long term carriers are the greater cause of the dissemination of diphtheria.

STULIK, Chicago.

TREATMENT OF WHOOPING COUGH WITH BACILLUS PERTUSSIS VACCINE. L. CSÖKE, Orvosi hetil. **80**:684 (July 19) 1936.

Csöke seems to be satisfied with the effect of the vaccine, which was used both for prophylactic and for curative purposes.

GÖTTCHE, Budapest, Hungary.

CLINICAL DIVISION OF CARDIAC DISORDERS CAUSED BY DIPHTHERIA. P. KISS, Orvosi hetil. **80**:898 (Sept. 19) 1936.

On the basis of 500 cases, Kiss divides the cardiac disorders as follows: 1. Early changes which arise at the same time as the diphtheritic membrane. These changes can be grouped into three subdivisions.

(*a*) Cardiac disorders in the first three days of the illness. In these cases the pulse is fast, the blood pressure is high, the coronary system dilated. Death occurs very rarely; when it does occur the symptoms are the same as in other infectious diseases: The heart beat is very rapid, the pulse rate is from 170 to 180, the diastolic time is shortened, the heart is empty, the coronary vessels cannot be filled, and therefore their nutrition is faulty.

(*b*) Myocardial disorders caused by the toxic effect. In these cases one observes the variable changes and symptoms of acute myocarditis.

(*c*) Increased irritation of the second and third degree centers. In these cases the symptoms are the same as in digitalis poisoning (mostly arrhythmias of extrasystolic character).

2. Late changes, chiefly heart weakness. The working elements of the muscles are destroyed and the connective tissues increased. The same condition develops as at the end of decompensation after valvular lesions.

GÖTTCHE, Budapest, Hungary.

Acute Infectious Diseases

LESIONS IN THE ROOTS OF THE PULMONARY ARTERY AND AORTA IN RHEUMATIC FEVER. L. GROSS, Am. J. Path. **11**:631 (July) 1935.

A variety of lesions found in the roots of the pulmonary artery and aorta and their pericardial mantles in rheumatic fever have been described and considered statistically. The observations were made on sixty-six actively rheumatic hearts, thirty-four hearts in which the rheumatic process was quiescent and fifty nonrheumatic hearts as controls. It is shown that in both active and inactive rheumatic fever the aortic and pulmonic roots display a strikingly high incidence of destructive and inflammatory lesions, consisting of scarring, elastica disruption, vascularization and other inflammatory phenomena. It is also shown that the pericardial mantles surrounding the roots of these great vessels display a high incidence of various vascular lesions. Some of these are similar to those due to age occurring in nonrheumatic controls. Others, however, are similar to the vascular lesions due to rheumatic fever found in the myocardial coronary ramification. The significance of these findings is discussed.

MOORE, New York. [FROM THE AUTHOR'S SUMMARY.]

LESIONS OF THE LEFT AURICLE IN RHEUMATIC FEVER. L. GROSS, Am. J. Path. **11**:711 (Sept.) 1935.

Gross and microscopic observations on the left auricle are described, based on an examination of eighty-seven rheumatic hearts. The material is classified into five clinical groups depending on the course of the disease. It is shown that macroscopic lesions of the left auricle occur in 80 per cent and microscopic lesions in 100 per cent of the cases. In the acute disease the lesions are very significant and characteristic. In the chronic disease they are considerably milder and often difficult to differentiate from normally occurring histologic changes. A description is also given of changes of the normal left auricle according to age periods as observed in fifty hearts.

MOORE, New York. [FROM THE AUTHOR'S SUMMARY.]

AN OUTBREAK OF MILK-BORNE HEMOLYTIC STREPTOCOCCIC INFECTION. A. W. NEWITT, J. W. GLASSEN and R. W. PRYER, Am. J. Pub. Health **25**:804 (July) 1935.

An outbreak of streptococcic sore throat in Petersburg, Mich., resulted in 186 known cases and 6 deaths; 52 cases occurred in children. The rate of attack was 28.6 per hundred inhabitants. The streptococci, which apparently came from one infected quarter of a cow, probably were of human origin. Though the symptoms

resembled those of septic sore throat and no erythema occurred, serologic evidence showed the organism to be similar to Streptococcus scarlatinae.

McBryde, Durham, N. C.

Skin Tests in Rheumatic Fever Children. Valentina P. Wasson, Arch. Pediat. **53**:318 (May) 1936.

One hundred and thirty-seven patients with rheumatic fever were given cutaneous tests with nucleoproteins of the hemolytic streptococcus; 79.4 per cent showed a positive reaction.

Ninety nonrheumatic children were tested with the same material, and 28.9 per cent showed a positive reaction.

The nucleoproteins were the same as those used by Fulton and Derick in their series of cutaneous tests.

Wasson feels that the test cannot be considered diagnostic of rheumatic fever but that a positive reaction strongly suggests the presence of the disease.

In the group with rheumatic fever the incidence of positive cutaneous reactions increases steadily with the age of the patients. The reaction was more marked in older children.

No correlation was noted between the intensity of the reaction and the severity of the cardiovascular disease.

Orr, Buffalo.

Prolonged Obscure Fever in Childhood. G. W. Kutscher Jr., Arch. Pediat. **53**:325 (May) 1936.

Kutscher mentions the various causes of obscure fever in childhood and reports several cases to illustrate some of the causes.

Orr, Buffalo.

Acute Articular Rheumatism. H. Gélinas, Union méd. du Canada **65**:232 (March) 1936.

Gélinas gives a succinct, reasonably complete summary of present knowledge of this disease.

Daffinee, Boston.

Oxyuris Infestation. Albert Guilbeault, Union méd. du Canada **65**:250 (March) 1936.

Guilbeault stresses personal cleanliness for the patient. His routine treatment consists of administration of (1) a preparation of bismuth by mouth for six days, (2) santonin and mild mercurous chloride for four daily doses, (3) a quassia enema every evening for a week, and (4) yellow mercuric oxide ointment locally to the anus after each enema and defecation.

Daffinee, Boston.

Acute Epidemic Neuromyelitis in Brazil. A. Austregesilo and A. Borges-Fortes, Rev. neurol. **64**:23 (Sept.) 1935.

The authors present a clinical, epidemiologic and pathologic study of an epidemic type of infectious neuromyelitis, probably due to a filtrable virus. The disease begins as a generalized infection with polyneuritis. As the cord is invaded, myelitic signs appear, and characteristically there is bulbar involvement. Although in most cases the disease is fatal, some of the patients recover partially or totally. Most of the cases occur in winter. Spinal fluid from infected persons injected into rabbit corneas produced intense inflammatory reactions, and that injected into rabbit brains produced encephalitis.

Extensive descriptions of the clinical and pathologic features are given.

Daffinee, Boston.

PNEUMOCOCCIC INFECTIONS IN INFANCY. J. BONABA and J. A. SOTO, Arch. de pediat. d. Uruguay **6**:497 (Dec.) 1935.

Bonaba and Soto present a study of pneumococcic infections in infancy, based on extensive bibliographic research and personal experience. Special stress is placed on infections of the serosae, on prophylaxis of pneumococcic infections in general and on treatment of these conditions. They advance a classification of the infections of the serous cavities which they consider valuable in prognosis and treatment. This includes: (1) simple serous reactions, (2) regressive serositis and (3) well defined serositis. In the first group spontaneous recovery is the rule; in the last, surgical intervention is generally indicated; in the second, the progress will determine the line of therapy to be followed. In discussing prophylaxis they mention the satisfactory results obtained in the nursery of the Casa del Niño, Uruguay, with intramuscular injections of whole blood. SCHLUTZ, Chicago.

THE ELECTROCARDIOGRAM IN CARDIAC DISTURBANCES DEVELOPING DURING TYPHUS ABDOMINALIS IN CHILDREN. P. KISS and B. WOLLEK, Arch. f. Kinderh. **106**:38, 1935.

The electrocardiogram remains normal in a suddenly developing circulatory disorder resulting from functional disturbance of the vasomotor system, differentiating disorder of the peripheral circulation from disease of the heart. Differentiation of arrhythmias due to disturbance of the conducting system from the simple respiratory arrhythmia common in typhus abdominalis can be made only by the electrocardiogram.

The electrocardiographic signs of myocardial disease in typhus abdominalis are found in the QRST section. The size of waves R and S is decreased, the limbs of R and S become finely splintered, thick, broken and knotty; the section ST can be changed, T becoming iso-electric or even negative.

Myocardial disease can develop without any specific cardiac findings; only the general condition of the patient and the electrocardiogram point to the cardiac involvement. CRANE, Chicago.

CLINICAL OBSERVATIONS OF TETANUS IN CHILDHOOD. H. PIEPENBRINK, Arch. f. Kinderh. **106**:65, 1935.

Three cases of tetanus neonatorum and eight cases of tetanus in older children are reported. CRANE, Chicago.

KALA-AZAR IN JUGO-SLAVIA. E. MAYERHOFER and B. DRAGIŠIĆ, Arch. f. Kinderh. **106**:103, 1935.

The kala-azar in Jugo-Slavia is a part of the epidemic which has spread through all of Mediterranean Europe. In June 1935, 112 cases had been diagnosed, of which 103 were in children. The great majority of the cases were in the warmer sections of the country, with only exceptional cases in the mountain regions.

The prognosis was almost certain death previous to the discovery of the specific action of antimony. Now, with early diagnosis and treatment with a pentavalent antimony compound, the para-aminophenylstibinate of diethylamine, there is good hope for recovery. The mortality rate is from 10 to 20 per cent, compared with from 90 to 100 per cent before antimony therapy was used. The prognosis is poor in the rare cases in which the disease is acute and runs its course within from thirty-five to forty days, and the younger the child the poorer is the prognosis. CRANE, Chicago.

NONSPECIFIC FACTORS IN THE AGGLUTINATION IN DYSENTERY. ROBERT MARTYN, Monatschr. f. Kinderh. **66**:16 (June) 1936.

Eighty children not suffering with dysentery were found to have agglutinins in their blood for Flexner Y groups A, B, D and H as well as for the Shiga strains. The highest titers were those of group H.

Children who had suffered from dysentery were examined from six months to one year later. At that time their agglutinin titer was identical to that of the control group.

Stimulants, such as blood transfusion or phenylethylhydantoin, cause an increase in agglutinins, but this is not specific. Not only is it not a typical agglutination, but the response is not in antibodies specific to the strain of organism with which the patient has been infected.

GERSTLEY, Chicago.

THE CLINICAL PICTURE OF INFANTILE ABDOMINAL TYPHUS (TYPHOID). S. L. RISKIN and C. G. CHUDIATIN, Azov-Black Sea Regional Pub. Co., symposium 3, article 1, 1935.

Seventy-four cases of typhoid fever were studied during the epidemic in Rostov, U. S. S. R., in 1932-1933. Most of the patients were admitted to the hospital during the second week of their illness. Typhoid in children from 3 to 13 years of age began in a form somewhat different from that in adults, usually starting suddenly with abdominal pain and diarrhea. The fever lasted from twenty to thirty days, subsiding by lysis. Later the stools were normal, or there was only slight diarrhea. Rose spots were seen in 38 per cent of the cases. Desquamation of the skin was pronounced in 50 per cent. In 81 per cent bronchitis was noted at some time during the illness. The spleen was enlarged in 55.7 per cent of the cases. In no case did intestinal hemorrhage or perforation occur. Arrhythmia of the pulse was seen in 9.4 per cent of the cases; this disappeared in time. The most frequent sequelae were catarrhal and purulent otitis media. During the height of the disease the sedimentation rate of the blood was at or slightly above the high normal rate. Toward the end of the illness, the sedimentation rate increased to several times the normal, reaching a maximum when the temperature dropped. Despite the clinical picture of typhoid, 13.8 per cent of the patients had negative Widal reactions. The fatality rate in this series was 2.7 per cent.

SEMENENKO-MCKHANN, Boston.

THE SEDIMENTATION RATE IN CASES OF INFANTILE ABDOMINAL TYPHUS (TYPHOID). Azov-Black Sea Regional Pub. Co., symposium 3, article 2, 1935.

Studies of seventy-two cases showed that the rapidity of red blood cell sedimentation offered an objective method of obtaining an estimation of the intensity of the infection. It was particularly altered during convalescence and was used in determining when children should be allowed full activity.

SEMENENKO-MCKHANN, Boston.

ACIDOSIS IN CHILDREN SUFFERING FROM ABDOMINAL TYPHUS (TYPHOID). G. H. GHASKIN-MUNDER, C. I. GMUD and L. S. SAKNOVSKY, Azov-Black Sea Regional Pub. Co., symposium 3, article 3, 1935.

The biochemical components of the urine were studied in thirty-eight children with typhoid. Diuresis was greater in these children than in healthy ones. The titratable acidity was found to parallel the intensity of the infection. The percentage of positive correlation between the ammonia in the urine and the titratable acid was less than in healthy children. Acidosis in typhoid paralleled, in general, the severity of the illness but was more pronounced in younger than in older children. During sleep the loss from the body was less than in the daytime.

SEMENENKO-MCKHANN, Boston.

Chronic Infectious Diseases

ADULT TYPE OF PULMONARY TUBERCULOSIS IN CHILDREN. W. L. WEINTRAUB, Arch. Pediat. **53**:588 (Sept.) 1936.

Weintraub reports on forty-three children under 15 years of age who had pulmonary tuberculosis of the adult type; 70 per cent were 13 years of age or over; 58 per cent were known to have been in contact with tuberculous patients. Twelve of the group were boys, and three were girls. This ratio again emphasizes the variance between the sexes with respect to the incidence of the disease in children.

On admission eighteen of the children had mild, nine moderate and sixteen far advanced tuberculosis. The eighteen who had mild disease had negative sputum; symptoms were present in 50 per cent; definite thoracic signs in 28 per cent and neither symptoms nor physical signs in 44 per cent. All of the children with far advanced and moderate disease presented symptoms, and all but one of the latter group had definite signs in the chest.

Of the sixteen whose lesions were far advanced, fourteen are dead, one is dying and one is treated with bilateral pneumothorax. Of the nine whose disease was moderate, two are dead, two are dying, one is under treatment, and in four the process is arrested. Of the group with mild infection, one is dead, two are under treatment, and in fifteen the condition is arrested. ORR, Buffalo.

TWO CASES OF SYPHILIS SHOWING ULCERATIVE SKIN LESIONS. DAVID NABARRO, Proc. Roy. Soc. Med. **29**:741 (May) 1936.

The patients were 12½ and 4½ years old. WILLIAMSON, New Orleans.

SYPHILITIC OSTEITIS IN LATER CHILDHOOD. E. LESNÉ, R. CLÉMENT, C. LAUNAY and T. DELON, Bull. Soc. de pédiat. de Paris **33**:198 (March) 1935.

A girl 11 years old was taken acutely ill with pain in the left knee. Tuberculous or acute infective osteomyelitis was considered, but the condition became subacute, and there was shown a fusiform thickening of the lower end of the femur. The Wassermann reaction of the blood was negative, and the child had no signs suggestive of syphilis. Nevertheless antisyphilitic treatment was given. This was followed by rapid recovery. A similar condition in a boy 15 years old, involving the upper end of the right femur, was treated as hip joint disease; the involved joint was immobilized in a plaster cast for seventeen months without improvement. After antisyphilitic treatment, the diseased bone healed. The tuberculin test and the Wassermann test of the blood were negative in the boy, but the Wassermann test of the father's blood was positive. BENJAMIN, Montreal, Canada.

TRACHEOBRONCHIAL GLANDULAR AND PULMONARY TUBERCULOSIS IN AN INFANT WITH EXTENSIVE CAVITATION OF THE LEFT APEX. L. BABONNEIX and B. MÉNÉTREL, Bull. Soc. de pédiat. de Paris **33**:218 (March) 1935.

An infant 6 months old, a girl, had a paroxysmal cough without stridor and had dyspnea resembling that of laryngismus stridulus. Roentgenologic examination revealed a widened mediastinal shadow, which was suspected to be due to a tumor. Necropsy showed that the shadow was from markedly enlarged tuberculous glands, that a cavity occupied the upper two thirds of the upper lobe of the left lung and that numerous areas of caseation were present in the right lung. The tuberculin test made early was negative, but that made a few days before death was positive. The source of infection was found in the mother of the infant.

BENJAMIN, Montreal, Canada.

TREATMENT OF TUBERCULOSIS IN THE NURSLING. L. ALCALDE NOY and MARTÍNEZ FRAILE, An. de pediat. **20**:508 (Sept.) 1935.

Direct family contact is the cause of tuberculosis in the nursling in the majority of cases, and in all instances the only outward symptoms are those of malnutrition. The authors attribute the malnutrition to tuberculous allergy producing cellular change and intoxication, which alters the absorption and assimilation of foods and is manifested by anorexia, insufficiency of digestion and intermediate metabolism, weakness, psychic changes and loss of weight. However, neither malnutrition nor marasmus alone is pathognomonic of tuberculous infection. The treatment of a nursling with a nutritional disorder secondary to tuberculosis is based on the positive reaction to tuberculin and on the roentgenogram of the chest, because in the infant the primary focus is pulmonary in practically all cases. It is not encapsulated and passes into the secondary period without change, causing more extensive and varied lesions. Treatment consists of hygienic measures, isolation from continuing infection and prompt attention to the malnutrition. Infants having no digestive disturbances tolerate feeding up to 175 calories per kilogram of body weight until lost weight is regained. After infection the infant is in a state of exhaustion and reacts to proper diet like a marasmic patient. The pulmonary lesions, restlessness and continual crying, by producing exaggerated action of the organs, lead to increased insensible perspiration, which by dehydrating the infant leads not only to enormous loss of weight but also to pernicious variations of the alkaline reserve and to circulatory disturbances. Lactate-Ringer solution is recommended for any variation in alkaline reserve.

GIFFEN, Toledo, Ohio.

MULTIPLE SPINA VENTOSA. D. A. CHAVES, Arch. de pediat., Rio de Janeiro **7**:541 (Sept.) 1936.

A boy of 10 years showed spina ventosa of the radius, phalanges and metatarsals. Photographs illustrate the report.

SANFORD, Chicago.

MULTIPLE TUBERCULOSIS IN A CHILD INFECTED BEFORE THE AGE OF THREE MONTHS. MARIA PLACE and J. A. SOTO, Arch. de pediat. d. Uruguay **7**:166 (April) 1936.

Place and Soto present a case of multiple tuberculous manifestations in a child who was infected before the third month of life. There were pulmonary, cutaneous and bony lesions. At the height of the condition the liver and spleen were very large. Both the pulmonary and the osseous lesions increased in extent, but the general health was not proportionately affected. Later the child improved greatly under dietary and hygienic treatment.

SCHLUTZ, Chicago.

TUBERCULOSIS WITH CAVITY FORMATION IN YOUNG CHILDREN. P. CANTONNET, H. LIEUTIER and H. CANTONNET, Arch. de pediat. d. Uruguay **7**:212 (May) 1936.

The authors report two cases of unilateral pulmonary tuberculosis with cavitation in 4 and 5 year old girls. The patients were treated by pneumothorax, with satisfactory results.

SCHLUTZ, Chicago.

IS THERE AN ETIOLOGIC SIMILARITY BETWEEN INFANTILE PARALYSIS AND TUBERCULOSIS? JUAN PAULIS, Med. de los niños **37**:37 (Feb.) 1936.

Paulis believes that some forms of infantile paralysis are the result of a tuberculous infection of the nervous system. Three reports are given concerning children who were admitted to the hospital with poliomyelitis as the cause of their last illness and who showed tuberculous meningitis at necropsy.

Further, the author states that all the children vaccinated against tuberculosis with the antialpha vaccine of Ferran have escaped poliomyelitis.

DWYER, Kansas City, Mo.

SOME INFANTILE DERMATOSES IN RELATION TO CONGENITAL SYPHILIS. G. RAMÍREZ VALDES, Rev. mex. de puericultura **5**:904 (Nov.) 1934.

For purposes of study Ramirez Valdes divided syphilis into three phases: (1) from birth to between 3 and 4 months, (2) from four months to three years and (3) from three years to puberty. Each phase has its certain and its probable signs for the diagnosis of syphilis. The certain signs of the first period include: pemphigus, characterized by bulla localized preferably on palmar surfaces; seropurulent coryza; splenomegaly; syphilitic skin manifestations; pseudoparalysis of Parrot; enlargement and swelling of the testicles, and a sign that is rare but characteristic of the disease, namely, a gummy or viscous ulcer of the umbilicus. The certain signs of the second period include craniotabes, protuberance of the frontal bone and pseudoleukemic anemia. The certain signs of the third period are the numerous dystrophies, such as malformation of the teeth (Hutchinson teeth) and of the nose (saddle nose), interstitial keratitis, bony lesions and deformities of the ear, as perforation of the arch. The differential diagnosis takes account of alopecia, vitiligo, Hebra's prurigo and ichthyosis. Of five cases of alopecia studied, syphilis was shown in none; of ten cases of vitiligo, a family history of syphilis was recorded in three and positive Wassermann reactions in two; of twelve cases of Hebra's prurigo, a family history of syphilis was noted in three and Hutchinson teeth in three, and, of four cases of ichthyosis, there was probably a syphilitic mother in one. The author believes that syphilitic infection is capable of influencing, with noticeable frequency, some of the infantile dermatoses, but it is not easy in many cases to determine clearly this relation; sometimes this is proved only after treatment for syphilis has been carried out and has resulted in clearing up the dermatosis. Therefore he believes antisyphilitic therapy is indicated in vitiligo, alopecia and prurigo after a careful study has been made in each case.

HERRON, Spokane, Wash.

CLINICAL TESTS OF FILTRATES FROM CULTURES OF THE TUBERCLE BACILLUS. RUDOLF FISCHL and A. HÖLZEL, Arch. f. Kinderh. **106**:200, 1935.

The reactions of ninety-five persons to intracutaneous injection of the filtrate of cultures of the tubercle bacillus as compared with their reactions to the Trambusti modification of the Mantoux test were observed. In diagnostic value the filtrate seemed inferior to tuberculin, but the results might be improved by the use of a more concentrated filtrate. The positive reactions to the filtrate obtained in two infants with negative tuberculin reactions suggest that a further study should be made. Both these children had tuberculous mothers, and one had received B C G.

CRANE, Chicago.

THE SIGNIFICANCE OF ALLERGOMETRY (V. GRÖER) IN TUBERCULOSIS IN CHILDHOOD. G. PETRANYE and J. MOTIKA, Monatschr. f. Kinderh. **65**:426 (May) 1936.

In 1933 von Gröer suggested a method for determining the status of the patient by classifying his allergic reactions into susceptibility (S) and reactivity (R). By studying the reactions to intracutaneous injections of a number of solutions of highly diluted tuberculin and by the use of logarithmic tables, he believes that he was able to estimate the allergic status of the patient.

The writers have applied his method to their material but cannot confirm his findings. They suggest a method which is even more complicated than his, and which is sufficiently complicated to be incomprehensible to the reviewer.

GERSTLEY, Chicago.

OPERATIVE TREATMENT OF TUBERCULOSIS OF BONES, JOINTS AND GLANDS. MAX JERUSALEM, Wien. klin. Wchnschr. **49**:559 (May 1) 1936.

Max Jerusalem states that the treatment of tuberculosis of the bones, joints and glands should be mainly conservative. The method will depend on the patient

and the stage of the illness. When an operation is needed, the following procedures may be considered: 1. Extirpation of small glandular tumors in the neck or axilla should be done if they are refractory to irradiation and other conservative methods. 2. Electrosurgical opening of small abscesses on the thorax or neck should be followed by curettage with an instrument that is not sharp. The wound is to be sewed up without provision for drainage, and roentgen therapy should be applied after the wound has healed. 3. Disease of the sheath of a tendon is to be treated in a similar manner. 4. Sequestrums of bone should be removed only when they have become severed by necrosis and lie in the soft parts as foreign bodies. 5. Resection of the knee joint is indicated, especially in adults, if there is a fibrous growth of the patella and the cartilaginous covering is atrophied. 6. Amputation may be undertaken in old persons suffering from progressive tuberculosis of the joints. 7. Osteotomy and arthroplasty may be necessary after patients have recovered from operations on the bones and joints.

Removal of foci of tuberculosis of the bone as they near the joint should be undertaken only after careful examination. The following measures are contraindicated: bare incision and drainage of a cold abscess, removal of a central sequestrum of bone, resection of carious ribs, extirpation of multiple glands in the neck or axilla and finally resection of all joints except that of the knee as indicated. In order to carry out operative treatment and after-care in a rational manner and to guard against secondary infections which may necessitate crippling operations, patients receiving surgical treatment for tuberculosis should be concentrated in one ambulatorium or clinic. The goal of all surgical treatment of tuberculosis should be rapid recovery with unimpaired function. The functional recovery must take preference over the anatomic.

ABT, Chicago.

RÔLE OF THE BOVINE TUBERCLE BACILLUS IN HUMAN PULMONARY TUBERCULOSIS. DIONYSIUS SZÜLE, Wien. klin. Wchnschr. **49**:748 (June 12) 1936.

Dionysius Szüle states that R. Koch in 1908 expressed the opinion that bovine tuberculosis is less virulent for man than the human type. Koch based this belief on the fact that the presence of bovine tuberculosis in the human sputum had never been proved. Since then such bacilli have been found on numerous occasions. However, Szüle reports that in two hundred and one cases which he studied he found the bovine type of bacillus in the sputum only twice. It is not likely that the bovine type of tuberculosis bacillus is transformed into the human type when it infects man. Rather, it retains its original properties.

Cummings, an English author, has observed that fifty-eight of the sixty-two recorded cases of pulmonary tuberculosis of the bovine type have been observed in the last ten years. He concludes that in England this type of infection is becoming more frequent. Szüle expresses the belief that this type of infection is decreasing and that the apparent increase noted in England is due to refined methods of detecting the bovine tubercle bacillus. He holds that infection from cows is becoming less and less important and that attention must be concentrated on man as the source of infection. But it must not be forgotten that the bovine type of tuberculosis may produce severe and even fatal infection in man.

ABT, Chicago.

EXTRAPULMONARY TUBERCULOSIS, WITH SPECIAL STUDY OF PRIMARY TUBERCULOSIS OF THE MUCOUS MEMBRANE OF THE MOUTH. J. DUKEN, Ztschr. f. Kinderh. **55**:687, 1933.

Duken discusses the various forms of extrapulmonary tuberculosis and calls particular attention to primary tuberculosis of the gums and mucous membranes of the mouth. He cites case histories to illustrate his point.

LEVINSON, Chicago.

LATE HEREDITARY SYPHILIS OF THE LIVER. A. ČECH and F. HERLES, Časop. lék. česk. **73**:241 (March 2) 1934.

Čech and Herles report a case of hereditary syphilis in a woman of 25 years in whom autopsy revealed lesions, mainly in the liver. These were perihilar and intra-acinous fibrous growths together with dry gummas, and were associated with cirrhosis.

STULIK, Chicago.

TUBERCULOTOXIC EXANTHEM IN A CHILD WITH TUBERCULOUS MENINGITIS. D. MORITZ, Orvosi hetil. **80**:220 (March 7) 1936.

In a 4 year old child with tuberculous meningitis there appeared, on the skin of the abdomen, three pale rose-colored spots the size of pinheads which were very similar to the roseolas of typhoid fever. The Widal test was negative. The pathologic examination showed tuberculous meningitis, and microscopic examination of the skin with roseola-like spots showed hyperemia of the corpus papillare without any signs of specific tuberculous change. Tubercle bacilli were not found. Exanthems of this type are allergic reactions of the skin, which may appear not only in fresh infections but also in reinfections or similar serous conditions. Their form may vary; they are sometimes like measles, sometimes like erythema multiforme; in this case they were like the roseola of typhoid fever.

GÖTTCHE, Budapest, Hungary.

EFFECTS OF TUBERCULIN TESTS ON CHILDREN IN THE CITY OF ROSTOV. C. I. IGNATOV, Azov-Black Sea Regional Pub. Co., symposium 3, article 4, 1935.

In Rostov, U. S. S. R., 69.6 per cent of the children gave positive tuberculin reactions. The group with positive reactions increased with the age of the children studied. Previous contagious diseases appeared to increase the tuberculous allergy of the body. Children with no evidence of the disease gave 51.3 per cent positive reactions. On the other hand, in some children with definite tuberculous involvement the results of the tuberculin tests were repeatedly negative.

SEMENENKO-MCKHANN, Boston.

Diseases of the Blood, Heart and Blood Vessels and Spleen

FUNCTIONAL COR BIATRIATUM TRILOCULARE. D. KORNBLUM, Am. J. Path. **11**:803 (Sept.) 1935.

A heart is described in which the interventricular septum was displaced to the left so that there resulted, on one hand, a large right chamber containing both the auriculoventricular orifices and the pulmonary artery and, on the other, a small left chamber which gave rise to the aorta. There is a full discussion of the genesis of this anomaly, as well as a good bibliography.

MOORE, New York.

AGRANULOCYTOSIS IN THE NEGRO. J. C. NORRIS, J. Lab. & Clin. Med. **22**:125 (Nov.) 1936.

A case of agranulocytosis in a Negro is presented. The rarity of this condition in Negroes is discussed, and Norris feels that this rarity is due to the fact that Negroes rarely take analgesics containing eucaine. This is due to the relatively high cost of such preparations and also to the Negro's ability to stand pain. In the case reported, Norris feels that large doses of quinine may have been the etiologic factor. One other case in which the condition was apparently due to quinine intoxication is mentioned.

MCMURRAY, Galveston, Texas.

ACUTE LYMPHATIC LEUKEMIA. A. VOLPE, Arch. de pediat. d. Uruguay **6**:519 (Dec.) 1935.

A case of acute leukemia in a 4 year old girl is reported. The clinical picture and differential count were characteristic, but the white cell count (total) showed rather marked fluctuations. No study of the marrow was made, and there was no autopsy.

SCHLUTZ, Chicago.

RHEUMATIC HEART DISEASE IN A MOTHER AND HER THIRTY MONTH OLD DAUGHTER. B. DELGADO CORREA and H. LIEUTIER, Arch. de pediat. d. Uruguay **6**:538 (Dec.) 1935.

The report concerns a 30 month old girl showing rheumatic fever complicated by cardiac involvement (mitral insufficiency). The mother, who had suffered from rheumatic fever the year before, presented the same heart lesion. The electrocardiograms in the cases were similar. The mother and the child slept in the same bed, a fact which suggests the possibility that rheumatic infection is contagious. The girl has been under treatment, and the condition has been arrested; the mother, who has not taken proper care of herself, has had exacerbations, including manifestations of heart failure. It is regarded as exceptional that rheumatic heart disease should occur in a child of the age of this one.

SCHLUTZ, Chicago.

TREATMENT OF THE MORE FREQUENT CARDIAC DISTURBANCES OF CHILDHOOD. P. KISS, Arch. f. Kinderh. **106**:207, 1935.

The treatment of septic endocarditis with acriflavine hydrochloride and repeated small transfusions, combined with surgical removal of any focus of infection, of rheumatic endocarditis with rest and salicylates, and of the different forms of diphtheritic carditis are fully described.

CRANE, Chicago.

APLASTIC ANEMIA IN CHILDHOOD. W. VELDE, Arch. f. Kinderh. **107**:15, 1935.

To the twenty-one cases of aplastic anemia in childhood recorded in the literature are added two others. A third case is reported, in which aplastic anemia was diagnosed clinically but in which autopsy was not performed.

CRANE, Chicago.

POSTOPERATIVE CHANGES IN THE MORPHOLOGY OF THE BLOOD IN CHILDREN AND THE TIME OF THE RETURN TO NORMAL. S. BOGORAD, Jahrb. f. Kinderh. **145**:91 (Aug.) 1935.

Five hundred examinations of the blood on sixty-five children who had been operated on form the basis for this report. The blood changes were: a decrease in erythrocytes, leukocytosis, a shift to the left in the Schilling count and lymphopenia. These changes were distinct three hours after operation. The amount of blood lost is a determining factor in the return to normal. Following a severe loss of blood the normal picture may not return for thirty days. If the changes in the white blood corpuscles increase further after from three to five days, this speaks for a wound complication or for an unfavorable course. The prognosis is especially doubtful when the percentage of neutrophils reaches 94 or over.

Prolonged narcosis and strongly traumatizing procedures that cause no notable loss of blood have no striking effect on the hemogram; in contrast stand the outspoken changes in the hemogram after bleeding.

The blood picture before operation gives important clues as to complications which might be expected, such as status thymicolymphaticus. A case is cited in which the blood had 45 per cent lymphocytes prior to operation. Death occurred three days after operation, with findings typical of status thymicolymphaticus.

In appendicitis with peritoneal complications frequent examinations of the blood give important clues regarding the prognosis.

LANDAU, Hannibal, Mo.

FUNCTIONAL DISTURBANCES OF THE HEART IN CHILDREN CAUSED BY OVER-EXERTION; SYMPTOMATOLOGY OF HEART DISEASE IN CHILDREN. W. N. NISSEN, Jahrb. f. Kinderh. **145**:96 (Aug.) 1935.

In one of the larger cities in the Union of Soviet Socialist Republics a number of school children were observed to have functional heart disturbances, which were attributed to overexertion in hill climbing, too active participation in sports and the like.

Careful physical examinations were made. Whenever possible, the children were followed by frequent examinations. The objective findings are considered the more important, for the young child is usually a poor observer of symptoms.

Slight enlargement, with change in the character of the heart tones, especially accentuation of the second sound at the apex, was sought. The accentuation of the second sound at the apex, previously undescribed in the literature, is considered of especial significance. This sign is designated as the sign of the sick heart of the child.

Functional disturbances of the heart usually clear up completely shortly after removal of the cause, although some persist for many months. This has been emphasized by previous authors, and in this Nissen concurs.

LANDAU, Hannibal, Mo.

ENDOCARDIAL REACTION OF THE MITRAL AND TRICUSPID VALVES OF INFANTS AND CHILDREN. H. J. WALDOW, Virchows Arch. f. path. Anat. **295**:21, 1935.

In thirty-five consecutive, unselected necropsies of children aged from 1 month to 15 years the mitral and tricuspid valves were examined macroscopically and microscopically for the changes described by Böhmig and Krückeberg as of frequent occurrence in the mitral valve after the second decade of life. In Waldow's series gross alterations were observed in every case but one. These consisted in localized minute verrucous elevations or more diffuse thickening of the valve segments along their line of closure. Microscopically there was localized subendothelial edema or more diffuse separation of the elastic fibrils, associated with slight fibroblastic or lymphocytic infiltration. The alterations bore no relation to the cause of death or the nutritional state. Lipoids were not detected in the endothelium. As causing the changes described, endocardial reaction is preferred to endocarditis.

SCHULTZ, Evanston, Ill. [ARCH. PATH.]

REVERSION OF HEMOLYSIS IN CHILDHOOD. F. ERBEN, Ztschr. f. Kinderh. **55**:669, 1933.

A micromethod is described by Erben for determining reversion of hemolysis in capillary blood from children. The method is a modification of the one described by Spiro. The phenomenon is as follows: If a hydrophilic substance is added to a varnished colored solution of blood corpuscles which appears free from blood cells, the erythrocytes become visible again under the microscope.

According to Starlinger, the reversion stays within narrow limits, between 10 and 15 per cent in healthy persons, but is increased, ranging between 20 and 40 per cent, in patients with blood dyscrasia, particularly, pernicious anemia.

Erben found a range of from 15 to 25 per cent in fifty-five healthy children and six healthy adults, four-fifths of the values lying between 17 and 21 per cent, with an average of 19.8 per cent. In secondary anemia there was an increase in reversion, which ran parallel with the intensity of regeneration.

LEVINSON, Chicago.

THERAPY OF RHEUMATIC EXUDATIVE PERICARDITIS. J. PROCHÁSKA, Časop. lék. česk. **72**:549 (May 5) 1933.

Procháska reviews the literature on the treatment of exudative pericarditis and cites three cases in which absorption of the exudate was hastened by intravenous

injection of calcium. In a case in which the exudation was very severe, two aspirations, one through the epigastrium and the other through the left mammary route, produced only 30 cc. of fluid. Posterior aspiration was not attempted because of the precarious condition of the patient. Injection of 10 cc. of calcium and of dextrose on alternate days produced in a week marked diminution of symptoms with reduction of the fluid. With calcium therapy the author feels that resorption is hastened, the usual period of four weeks being reduced to from seven to fourteen days.

STULIK, Chicago.

VENTRICULAR PARASYSTOLE IN A CHILD. A. HELBICHOVÁ, Časop. lék. česk. **73**:43 (Jan. 12) 1934.

A boy of 5 years came to the hospital with persistent extrasystoles. He had had all of the childhood diseases, including pneumonia. The extrasystolic rate was about 31 per minute, which is rather low in comparison with others that have been reported, viz., from 30 to 60 per minute. The rate in this case approximated that in complete sinoventricular heart block.

STULIK, Chicago.

Diseases of Nose, Throat and Ear

RETROGRADE SINUS THROMBOSIS COMPLICATING PRIMARY THROMBOSIS OF THE JUGULAR VEIN. F. E. STONE and M. D. BERGER, Arch. Otolaryng. **24**:141 (Aug.) 1936.

When an original infection is followed by extension into remote parts, the exact diagnosis and the method of obtaining surgical relief is usually speculative. Two cases of retrograde thrombosis of the sigmoid sinus complicating primary thrombosis of the jugular vein are on record in which surgical intervention was successful.

The authors describe routes of infection from the original focus: (1) hematogenous, (2) lymphatic, (3) continuous, (4) pterygoid, (5) sphenoid, (6) aural, (7) tonsillar (8) via the carotid venous plexus with direct spread into the lumen of the cavernous sinus.

The clinical picture of an infection deep in the neck is given. The signs, symptoms and laboratory procedures helpful in reaching an intelligent conclusion are elucidated. After a diagnosis is established, therapy along conservative lines is totally inadequate, according to the authors, and they describe the surgical procedures that should be followed. Systemic therapy includes urgent supportive measures, essential for a favorable prognosis.

Four cases are cited, and the authors conclude that if retrograde thrombosis of the lateral sinus complicating thrombosis of the jugular vein could be diagnosed readily and operation performed early, the patient could be cured.

GREENWOOD, Chicago.

SINUSITIS IN CHILDREN. LAWRENCE K. GUNDRUM, Arch. Pediat. **53**:287 (May) 1936.

The subject of sinusitis is reviewed by Gundrum. The type most frequently seen in children is a low grade catarrhal sinusitis. The treatment which the author has found most successful is the displacement irrigation suggested by Proetz. The medicament used is either 0.5 per cent ephedrine in a physiologic solution of sodium chloride or 0.5 per cent phenol in light liquid petrolatum. The author states that recently he has had favorable results with diluted bacterial antigens. Slightly better results were obtained by the use of stock rather than autogenous antigens.

The treatment consists of a 10 per cent solution of bacterial antigen in a 0.125 per cent solution of neosynephrin in a physiologic solution of sodium chloride.

The concentration of the antigen is gradually increased until a maximum of a 50 per cent to 100 per cent solution is reached. The stock antigen consists of staphylococci, streptococci and Bacillus coli.

Three case reports are included in the paper. ORR, Buffalo.

RESPONSE OF A RETROLARYNGEAL INFECTION TO X-RAY THERAPY. HAROLD R. ROEHM, Arch. Pediat. **53**:348 (May) 1936.

Roehm reports a case of retrolaryngeal infection occurring in a boy 9 years of age. The diagnosis was made from a lateral roentgenogram of the cervical portion of the spine, which showed a marked thickening of the retrolaryngeal tissues, with a forward displacement of the larynx, trachea and esophagus, extending to the seventh cervical vertebra.

A blood transfusion and two roentgen treatments produced marked improvement. ORR, Buffalo.

REPEATED COLDS IN CHILDREN. C. G. KERLEY, Arch. Pediat. **53**:598 (Sept.) 1936.

Kerley reports a study of 504 children who had had repeated colds. The boys numbered 272 and the girls 232. Their distribution according to age was as follows: Under 1 year, 12; from 1 to 2 years, 13; from 2 to 5 years, 132; from 5 to 10 years, 263; from 10 to 15 years, 84.

All children with associated illness were excluded from the study.

Of those included, 380, or 75.4 per cent, showed roentgenographic evidence of disease of the accessory sinuses; 252 of these had had tonsils and adenoids removed; 419, or 83.4 per cent, had definite pathologic disease of the upper respiratory tract.

Kerley states that the best insurance against the common cold is a normal upper respiratory tract. Second in importance is physical resistance of a high degree developed through properly adjusted habits of life. ORR, Buffalo.

PHYSICAL IMPAIRMENTS OF DEAF CHILDREN. G. L. DRENNAN, Illinois M. J. **70**:254 (Sept.) 1936.

In a survey of fifty-eight children entering the Illinois School for the Deaf during 1936, Drennan and his associates found that 56.9 per cent came to that institution as a result of acquired deafness, and 39.6 per cent were congenitally deaf. A congenitally deaf child, they found, may be the victim either of frankly hereditary forces or of an obscure lesion. Owing to the constant intermarriage between deaf-mutes and the fact that speaking and hearing members of such families often have deaf-mute children, congenital deaf-mutes have been increasing in number.

Drennan believes that it cannot be emphasized too strongly that most deafness is partial and acquired. Deafness of all types is more easily prevented than cured, and the efforts to prevent deafness cover the entire field of biologic activity.

Of etiologic factors, meningitis was responsible for 27.2 per cent; whooping cough, for 18 per cent. All of those deaf as a result of whooping cough were deafened before they were 1½ years of age. Measles caused 11.8 per cent; scarlet fever, 6 per cent. Following these, there were causes such as congenital syphilis, undiagnosed fever, mastoiditis, otitis media, skull fracture, head injury, typhoid fever and summer complaint (cholera morbus). Of this group, 73 per cent became deaf before the age of 5 and 64 per cent before the age of 2. Among those under 2 years of age, whooping cough and meningitis were each the cause in 28.5 per cent, and measles in 9.5 per cent. The control of infectious diseases and skilled attention to the ears when complications are present will do much to diminish the frequency of deafness from these causes.

This group of fifty-eight children studied from the point of view of general physical defects exclusive of deafness presented an interesting challenge; that is,

90 per cent of the group showed one or more physical defects besides that for which they were admitted to the school; 80 per cent showed defects which necessitated medical attention. Of the group who were deafened by 2 years of age, 100 per cent showed other physical defects. The need to prevent these physical defects antedates the school age by five and a half or six years. Proper care in infancy and immunization against diseases for which the profession has active immunizing agents will accomplish much toward perfecting the development of children. Early diagnosis of the infectious diseases and prompt administration of indicated antitoxins, vaccines or antiserums are important in preventing the dire complications, which are frequently more serious than the disease itself.

BARBOUR, Peoria, Ill.

STUDIES ON THE COMMON COLD: VI. CULTIVATION OF THE VIRUS IN TISSUE MEDIUM. A. R. DOCHEZ, K. C. MILLS and YALE KNEELAND JR., J. Exper. Med. **63**:559 (April) 1936.

Studies of the cultivation of the virus of the common cold in a tissue medium and the capacity of the cultured virus to induce infection in human volunteers are reported.

Detailed descriptions are given of the methods employed to isolate, preserve and cultivate the virus and to test its activity in human volunteers.

The virus of the common cold can easily be isolated from properly selected patients and cultivated in a tissue medium.

When kept in the original nasopharyngeal washings, the virus will survive at icebox temperature under anaerobic conditions for at least thirteen days.

If the nasopharyngeal washings are frozen and dried in vacuo, the virus retains its activity for at least four months.

The virus of the common cold has been proved to multiply in a medium containing chick embryo tissue. Such cultures retain their capacity to produce typical infections in human beings for many transfers, over several months. Attempts to cultivate the virus have been successful in seven of eight instances.

Prolonged cultivation of the virus in a tissue medium eventually leads to a loss of activity.

KNICKERBOCKER, Dallas, Texas.

AUDIOMETRIC STUDIES ON SCHOOL CHILDREN. A. CIOCCO, Pub. Health Rep. **51**:1609 (Nov. 20) 1936.

Studies were made on 1,400 school children in Washington with the 2-A audiometer of the Western Electric Company. The results showed that the curves found for children may duplicate any of the curves found for adults. A conductive lesion is responsible in about two thirds of the cases, for impairment of hearing which involves tones of the middle and low ranges. The incidence of loss in high tones increases with age and is higher in boys than in girls. Normal tympanic membranes and membranes with slight change were found in 96 per cent of the ears which had good hearing, in 87 per cent of those with loss of high tones, in 80 per cent of those with impairment of hearing for conversation and in 56 per cent of those with conduction deafness. Apparently there is no relation between the type and degree of hearing impairment and the condition of the nose and tonsils as observed at the time of examination.

SANFORD, Chicago.

TREATMENT OF ACUTE TONSILLITIS WITH ANTIDIPHTHERITIC SERUM. M. SCHACHTER, Med. de los niños **37**:33 (Feb.) 1936.

When acute tonsillitis assumes epidemic proportions, diphtheria should be suspected and prophylactic serum used. Schachter gives one dose of 5,000 units of antitoxin to patients with acute tonsillitis with high temperature, dysphagia and the usual bacterial flora. Even when the tonsillitis is not due to Löffler's bacillus the condition seems to improve rapidly.

DWYER, Kansas City, Mo.

THE PROBLEM OF OTITIS MEDIA IN INFANTS AND SMALL CHILDREN. H. KNAUER, Arch. f. Kinderh. **106**:227, 1935.

In an epidemic of otitis media in Bonn, Germany, bacteriologic examination revealed a great variety of organisms. Even from patients obviously deriving infection from the same source different bacteria were cultured. It seems probable that the bacterial invasion was secondary to a primary infection with a filtrable virus.

CRANE, Chicago.

RÔLE OF OTITIS IN PEDIATRICS. E. VON GYÖRGY, Arch. f. Kinderh. **107**:28, 1935.

Otitis media may be comparatively mild in normal infants, but in undernourished, atrophic or tuberculous children it is much more serious. It may occur as a primary infection, or it may be secondary to a catarrhal infection or to a gastro-intestinal disturbance; or respiratory or gastro-intestinal disturbances may occur as complications of otitis. Early paracentesis or, if toxic symptoms develop for which there is no apparent cause other than otitis, antrotomy gives excellent results.

CRANE, Chicago.

LEUKOPENIA IN PHARYNGOGENIC (TONSILLOGENIC) SEPSIS. R. WALDAPFEL, Monatschr. f. Ohrenh. **69**:1178 (Oct.) 1935.

Waldapfel uses the more inclusive term "pharyngogenic sepsis" instead of the more frequently used "tonsillogenic sepsis" because he regards the tonsils as a portion of the pharyngeal mucous membrane. A septic focus may exist at any site in the pharynx, but it is, of course, most frequent in the tonsils. If an infectious process originates in the pharynx and produces general symptoms in the organism, two extreme effects may appear in the blood apparatus: (1) the usual leukocytosis, with deviation of the cellular types to the left (outflow of immature elements), and (2) in rarer instances paralysis of the leukopoietic system, involving either the maturation process of the cells or the mechanism of the outflow of the cells. In this report the author concerns himself with neither of these effects but with a condition that stands between the two, namely, granulocytopenia or the absence of leukocytosis. He reviews the reports of several cases from the literature and describes several cases which he observed. Common to all these cases was leukopenia or the absence of leukocytosis, usually in the presence of deviation of cell types to the left. Moreover, in all cases the condition had a lethal outcome. The author concludes that, although not every case of pharyngogenic sepsis in which the termination is fatal is accompanied by leukopenia, it can, nevertheless, be stated that in the cases in which the leukocytic reaction is absent the disease usually has a fatal outcome and that deviation to the left without leukocytosis indicates a much less favorable prognosis than does deviation to the left with leukocytosis, for the deviation to the left in the presence of a low leukocyte count indicates that the reserves of the organism are mobilized but that no further defense action may be expected. On the other hand, an organism with power of resistance responds to severe infection not only with deviation to the left but, as a sign of normal defense, with a large number of leukocytes.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

FATAL PARENCHYMATOUS HEMORRHAGE FOLLOWING TONSILLECTOMY. E. URBANTSCHITSCH, Monatschr. f. Ohrenh. **69**:1187 (Oct.) 1935.

Urbantschitsch reports the clinical history and the results of necropsy in a case of fatal hemorrhage after tonsillectomy. Careful observation at necropsy did not disclose a vessel of even medium caliber that could be considered to be responsible for the hemorrhage. The hemorrhage took place in drops, unnoticed by the patient and by those who watched her. The use of a vascular ligature was therefore out of the question. Moreover, the patient never lost consciousness and only once, about five hours after the operation, stated that she felt as though the wound on the left side was bleeding. A real hemorrhage was never observed in spite of repeated inspections. Thus, this case is a peculiar instance of fatal parenchymatous hemorrhage.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

NEW TREATMENT OF TONSILLITIS. G. WOTZILKA, Monatschr. f. Ohrenh. **69**:1189 (Oct.) 1935.

Wotzilka directs attention to Waldapfel's studies in which that author demonstrated that substances which are injected into the lower nasal concha reappear in both tonsils. The connection between the concha and the tonsils is established by the veins that drain the cavernous tissue and communicate with the pharyngeal veins. To be sure, even when intravenous injection is made at other sites, small particles of the injected material appear in the tonsils but in much smaller quantities than when injection is made into the cavernous tissue of the nose. Waldapfel's observations on the connection between the nasal concha and the tonsils suggested to Wotzilka that it should be possible to introduce antibacterial medicaments into the tonsils by way of the lower nasal concha. As a medicament he chose a substance with which he had obtained good results in the treatment of otogenic meningitis. It contained methenamine and sodium salicylate in aqueous solution. After anesthetization of the lower concha he slowly injected 2.5 cc. of the substance. He obtained favorable results with this treatment in several cases of acute tonsillitis, in that the temperature fell rapidly and the pains in the throat and the difficulty in swallowing disappeared within several hours. Injection of the substance into the cubital vein was likewise followed by reduction in temperature, but it was less rapid and the local symptoms responded much more slowly than after injection into the nasal concha. In the conclusion, Wotzilka emphasizes that he wishes not to stress the value of the medicament he used but to direct attention to a new method of application of medicaments in the treatment of tonsillitis, namely, injection into the lower nasal concha.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

TRANSITORY BACTEREMIA FOLLOWING TONSILLECTOMY. FISCHER and GOTTDENKER, Wien. klin. Wchnschr. **49**:177 (Feb. 7) 1936.

Among the explanations which Fischer and Gottdenker offer for the recrudescence of an old process, such as nephritis, polyarthritis or endocarditis, or the causation of a new disease, such as septicemia, following a tonsillectomy are: transmission of bacteria from the wound to the blood stream, resorption of exotoxins or endotoxins from the surface of the wound and an allergic reaction in which bacterial proteins are resorbed by the wound and act as allergens. The object of the investigation was to determine whether the first of these conditions, namely, the entrance of bacteria into the blood stream, is possible after tonsillectomy.

The authors made investigations of the blood (obtained from the cubital vein) five minutes before and five minutes after tonsillectomy and also two, twelve and twenty-four hours later. Among fifty-one patients thus investigated, sixteen showed the presence of bacteria in the blood stream after tonsillectomy. The maximum bacteremia was observed two hours after the operation. From twelve to twenty-four hours after operation the blood was always sterile. In the sixteen cases in which organisms were present the following bacteria were found: anhemolytic streptococci, seven times; pneumococci, once; Stapylococcus aureus haemolyticus, three times, Staphylococcus albus, twice, and Staphylococcus aureus anhaemolyticus, three times. A relation between the bacteria cultivated directly from the tonsils and those from the blood could not be proved. The indications for tonsillectomy were recurrent sore throat with or without general symptoms (polyarthritis or endocarditis). The operation was usually undertaken some time after the angina had subsided and only once immediately after an attack. For control, the blood of fifteen patients who underwent other operations, such as resection of the septum, was observed. In one case Staph. aureus anhaemolyticus was found; the remaining blood cultures were sterile.

Schwarz and Frisch noted bacteremia in three of eleven patients immediately after tonsillectomy. Two hours after tonsillectomy Bartlett and Pratt found streptococci in 6 per cent of the cases. Wirth could find no evidence of bacteremia after tonsillectomy in forty-five patients.

ABT, Chicago.

HISTOLOGIC CHANGES OF THE EAR IN NIEMANN-PICK DISEASE. E. OPPIKOFER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **39**:77, 1935.

Oppikofer describes histologic studies on the petrous bones of a child who died at the age of 27 months as the result of Niemann-Pick disease. He detected typical Niemann-Pick cells at different sites in the external, middle and internal ear. In accordance with the general pathologic-anatomic aspects, they were most numerous in the bone marrow. The changes on the internal ear were not sufficient to explain the clinically determined deafness, and deafness of central origin was assumed. Examination of the brain corroborated this assumption.

EDITOR'S EXTRACT. [ARCH. OTOLARYNG.]

TONSILLECTOMY IN THE ACUTE STAGE OF INFLAMMATION. A. JAUERNECK, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:292 (Nov.) 1935.

Jauerneck points out that until recently it was generally considered advisable to postpone operation on the tonsils until several weeks after recovery from tonsillar abscess or angina. Winkler, however, departed from this rule and advised tonsillectomy during the acute stage of tonsillar abscess but advised against this intervention in the course of angina without a suppurating process. The author calls attention to the fact that this differentiation made by Winkler has been corroborated by recent immunologic studies. Gangl-Battig reported in 1933 that the immunity, measured on the basis of values for phagocytes, is increased at the time the tonsillar abscess is at the height of its development and then decreases but that after another two or three weeks it increases again and reaches normal values in about five weeks. However, in angina without suppurative disintegration the phagocytic values are below normal at the height of the disease process, but after that they gradually increase and reach normal values in about five weeks. The author concedes that it is often difficult to determine whether there is a small abscess or progressive tissue infiltration without free pus. The phlegmonous processes which progress without the formation of pus are the most malignant, and early tonsillectomy is especially important in cases of this condition, for it is the only way to produce a wide opening of the phlegmonous area. In determining the advisability of tonsillectomy during the acute inflammatory stage, differentiation between phlegmon and abscess is unnecessary. The author advises tonsillectomy in the treatment of (1) deep and hidden abscesses that cannot be located by incision and (2) abscesses that do not heal in spite of successful incision and apparently free discharge of pus. In cases of the latter type there usually exist multiple abscesses, abscesses with several bays, or phlegmonous processes. In accordance with these two indications, the author operated in ten cases, and the results were always good. As a third indication for tonsillectomy he considers incipient septic conditions during or after tonsillar abscess and angina in the course of which peritonsillar phlegmonous infiltration seems probable. Finally, he resorted to tonsillectomy in a number of patients in whom laryngeal edema threatened in the course of acute tonsillitis, with phlegmonous infiltrate under the tonsil. The phlegmon that develops during or after angina near the larynx and has a tendency to spread downward is always grave, and he thinks that it is advisable to extirpate the involved tonsil. After removal of the tonsil the laryngeal edema usually disappears rapidly.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

PNEUMATIZATION OF THE SQUAMOUS PORTION OF THE TEMPORAL BONE AS A CAUSE OF COMPLICATIONS IN ACUTE SUPPURATION OF THE MIDDLE EAR (SQUAMITIS): A CASE OF CEREBRAL ABSCESS WITH PERFORATION INTO THE VENTRICLE. K. GRAHE, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:365, 1936.

According to Grahe, it is well known that the pneumatization of the mastoid process is of importance in the course of inflammation of the middle ear. Observations in recent years indicated that abnormal pneumatization of the pyramidal

apex (petrositis) and of the processus zygomaticus (zygomaticitis) is of essential influence on mastoiditis. A third site at which abnormal pneumatization is likely to occur is the squamous portion of the temporal bone. Grahe says that although the development of pneumatization in the squamosa possibly has been mentioned in the literature it has not been systematically investigated.

In order to direct attention to this form of squamitis, he reports four cases in which the pneumatization of the squamous portion of the temporal bone exerted an influence on the course of acute otitis media. The first patient had acute epitympanal otitis on the right side. Roentgenoscopic examination of the mastoid process disclosed abnormal pneumatization of the squamous portion of the temporal bone. When the mastoiditis did not subside, this roentgenologic observation induced the author to resort to antrotomy sooner than he would have otherwise, so as to avoid a complication from this source. In the second case the roentgenoscopic examination had been neglected before the first intervention, and several weeks later a second operation became necessary because the squamous portion of the temporal bone with its abnormal pneumatization had become involved. The author is convinced that if the roentgenoscopic examination had been made before the first surgical intervention, the second operation could have been avoided. In the third case mastoiditis led to involvement of the pneumatization in the squamous portion of the temporal bone. The process resulted in breakdown of the outer table and in subperiosteal abscess. Moreover, the dura was exposed in two places, and extradural abscess existed. In the fourth case abscess of the temporal lobe developed by way of the pneumatized squamous portion of the temporal lobe after suppuration of the middle ear. The abscess perforated into the ventricle, but the patient recovered.

In the summarizing discussion the author points out that the cause of the abnormal pneumatization of the squamous portion of the temporal bone is not definitely known. However, since some investigators detected pneumatization of this region frequently in anthropoid apes, the author suggests that it might be an atavism. He stresses that roentgenoscopic examination is a great aid in the diagnosis of involvement of a pneumatized squamous portion of the temporal bone and that it should be resorted to in all cases of otitis media. This examination and consideration of the possibility of squamitis will permit an early diagnosis and correct treatment.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

MENINGITIS IN ANGINA. F. JENNEMANN, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:372, 1936.

According to Jennemann, meningitis is one of the comparatively rare sequels of angina. He gives detailed histories of three cases and following this discusses the pathogenesis. He points out that the spreading of the tonsillar infection takes place most frequently by way of the lymphatic system, more rarely by way of the blood stream. Once the infection has reached the parapharyngeal space, there is nothing to prevent its spreading in the direction of the base of the brain, but practical experience teaches that this possibility is rarely realized.

The treatment of postanginal meningitis consists chiefly in lumbar and suboccipital punctures and in the intravenous or intraspinal administration of methenamine or other substances. In the author's cases the treatment consisted chiefly of lumbar puncture, the administration of anodynes and artificial feeding. After the cerebral complications had subsided, tonsillectomy was done.

The author further reviews case histories from the literature and says that in this paper he considers only the cases of meningitis after angina and disregards the more frequently observed cases of postanginal complications, in the course of which there develop sinus thrombosis, extradural abscess or other complications, with the subsequent development of meningitis. In the summary he states that between the onset of the process, which appears harmless at first, and the development of the meningitis there elapse only a few days. There is no reliable symptom that permits the early recognition of the complication. After the treatment of the meningitis has been completed, the patient should be urged to undergo

tonsillectomy. As far as the reported and reviewed cases permit a general conclusion, the prognosis of the postanginal meningitis seems favorable, particularly in comparison with other forms of meningitis.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

CONGENITAL EPITHELIAL DUCTS AND CYSTS OF THE BACK OF THE NOSE. C. E. BENJAMINS, Nederl. tijdschr. v. geneesk. **80**:1886 (May 2) 1936.

Benjamins delivered a clinical lecture on some observed cases of congenital cysts and ducts of the back of the nose, which never communicate with the cavity of the nose and which show an exclusively dermoid character. Especially toward puberty further development is possible. The source of the deviations is extensively discussed. The treatment should always be surgical.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of Lungs, Pleura and Mediastinum

SIGNIFICANCE OF ROENTGENOLOGIC CHANGES IN DIFFERENTIAL DIAGNOSIS OF ATELECTASIS. W. F. MANGES and J. T. FARRELL JR., Am. J. Roentgenol. **30**:429 (Oct.) 1933.

Manges and Farrell present charts and pictures illustrating the various reactions of atelectasis. The roentgen phenomena fall into two classes: (1) increase in the density of the shadows of the involved portion of the lung and (2) displacement of the heart and other mediastinal structures toward the side of involvement, with elevation of the diaphragm on the affected side. The roentgen signs vary with the cause, the bronchus involved, the duration of the collapse and its sequelae. Atelectasis due to an aspirated foreign body, as well as that due to bronchial neoplasm, is frequently followed by inflammatory changes, abscess and bronchiectasis. The close association of atelectasis and bronchiectasis is not generally recognized. Acute postoperative, pneumococcic and asthmatic atelectasis usually resolve, leaving no roentgenologically recognizable residue. Congenital atelectasis, which is uncommon, is considered due to respiratory dysfunction, but it may follow occlusion of a bronchus by material aspirated with postnatal primary inspirations.

STULIK, Chicago.

BRONCHIAL FOREIGN BODY WITH SIMULTANEOUS UNILATERAL EMPHYSEMA AND COLLAPSE. INO KUBO, Arch. Otolaryng. **24**:289 (Sept.) 1936.

Atelectasis of the lung is differentiated from an emphysematous condition. The history, clinical findings and roentgenograms are given revealing that emphysema and collapse of one lung followed the inhalation of a head of wheat by an 8 month old child. The interpretation of the x-ray pictures was most difficult, and bronchoscopic examination was deemed the best solution. This procedure is described, and the findings are given. The author concludes that the beard of a head of wheat was partially obstructing the upper and middle portions of the bronchus, whereas the lower portion was completely obstructed by the head. Both the bearded portion and the head were removed, as well as accumulations of bronchial secretions. The recovery was uneventful, and within twenty days after the baby's discharge from the hospital the chest was entirely normal.

GREENWOOD, Chicago.

INFANTILE CACHEXIA DUE TO RESPIRATORY INSUFFICIENCY. G. ROSENTHAL, Paris méd. **2**:305 (Oct. 31) 1936.

Rosenthal reports the case of a malnourished child in whom there had been respiratory obstruction due to large adenoids. Following adenoidectomy the child was insufficiently supervised and showed a minimal respiratory excursion. The

author feels that there was resulting insufficiency of oxygenation of the blood, which brought in its train severe malnutrition. Recovery ensued when the child was taught how to breathe properly.

LESLIE, Evanston, Ill.

PULMONARY HYDATID CYST. BUXÓ IZAGUIRRE, An. de pediat. **2**:101 (Feb.) 1935.

A case is presented, that of a boy of 11 years. The parents thought the onset followed a fall while he was playing, in which he struck his back and side. In two days pain developed in this side, with fever and cough. The pain increased on deep inspiration and persisted for several months, up to the time of admission. Examination at that time revealed increase in breath sounds over the left side of the chest. In the right axilla there were heard a blowing expiration and diminished breath sounds, and the chest movements on this side were diminished. There was solidity in the central region. An x-ray plate revealed a dense shadow over the lower half of the right side of the chest. The Mantoux test was negative. Sputum was abundant but negative for Koch bacilli. The case has been followed for over two years, and x-ray plates have been made frequently. The cyst gets smaller and then larger. The author believes that it will show a spontaneous cure.

HERRON, Spokane, Wash.

FREQUENCY AND LOCALIZATION OF PNEUMONIA IN THE INFANT UNDER ONE YEAR OF AGE. C. PELFORT, Arch. de pediat. de Uruguay **7**:185 (May) 1936.

Pelfort maintains that lobar or croupous pneumonia in the first year of life is of frequent occurrence. He has observed 64 cases in the years 1923-1935 among 300 children under 3 years of age. During the period 1933-1938 practically every patient was followed by means of the roentgen rays. He observed 30 cases in which 38 different localizations of the lobar distribution occurred. The upper lobe of the right lung was the most frequent site of involvement (47.36 per cent), followed by the lower and upper lobes of the left lung (15.79 per cent) and finally the middle and lower lobes of the right lung (10.52 per cent).

SCHLUTZ, Chicago.

DIAGNOSIS OF ASPIRATION OF A FOREIGN SUBSTANCE IN CHILDHOOD. E. VON GYÖRGY, Orvosi hetil. **80**:919 (Sept. 26) 1936.

György enumerates all the procedures which are necessary if one is to diagnose precisely in cases of aspiration: an exact anamnesis, careful observation of clinical signs such as the breathing, the voice of the child, its cough and cyanosis, roentgenographic examination, laryngoscopy and tracheobronchoscopy.

GÖTTCHE, Budapest, Hungary.

SPONTANEOUS PNEUMOTHORAX IN NEW-BORN INFANTS. N. I. HEYBROEK, Nederl. tijdschr. v. geneesk. **80**:2468 (May 30) 1936.

In three observed cases of spontaneous pneumothorax in new-born children the predisposing factors, diagnosis and prognosis are considered. This condition is probably more frequent than one would conclude from the literature, especially in large infants who have been strangled by the umbilical cord. The diagnosis can be made with certainty only by roentgenologic examination.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of the Gastro-Intestinal Tract, Liver and Peritoneum

OBSTRUCTIONS ABOUT THE MESENTERY IN INFANTS. J. J. MORTON and T. B. JONES, Ann. Surg. **104**:864 (Nov.) 1936.

Morton and Jones discuss in detail the embryologic development of the gastro-intestinal tract and report eleven cases of obstruction about the mesentery. From these cases they summarize the findings under the following heads:

Symptoms and Signs.—The most constant symptom is vomiting. It may occur a few hours after birth, but usually it is observed only after the first feeding. In

most cases it begins mildly but progresses to the projectile type. The contents of the vomitus are carefully noted. Accompanying the vomiting are the usual upset in bowel elimination, loss of weight and dehydration.

Course.—Usually there are attempts to correct the vomiting by changing the frequency or the consistency of the feedings, feeding by tube and refeeding, with no results. When, in spite of all efforts, vomiting continues, the authors attempt to localize the lesion accurately by roentgenologic examination.

Roentgenologic Examination.—Although they admit that a barium sulfate mixture should not be used above an obstruction, they make use of a thin mixture of barium sulfate. They believe that the information which the procedure gives outweighs the disadvantages, since they have usually decided to operate in any case in which there is persistence of symptoms. The barium sulfate can be evacuated by lavage or by vomiting when the operation has to be delayed.

Differential Diagnosis.—The only real problem is to differentiate congenital hypertrophic pyloric stenosis. This occurs more often in males and usually in the first born child; it has an onset at about two to six weeks after birth; the vomiting becomes projectile and is associated with peristaltic waves; there is a palpable tumor. These findings do not hold for other types of high obstructions.

Prognosis.—Without operation, the mortality is extremely high. In a certain percentage of cases the congenital defects are multiple and beyond the aid of surgery. Early recognition of the condition naturally reduces mortality from surgical intervention.

Operation.—The preliminary preparation for operation is exceedingly important. Loss of weight and dehydration must be combated by restoring the water balance. Blood, water, dextrose and salt may be used as circumstances require. Babies with such obstructions usually are subjected to fluoroscopy for enlarged thymus. Usually no preoperative use of drugs is necessary. Occasionally atropine in doses of from 0.0025 to 0.005 grain (0.00016 to 0.003 Gm.) is given. Formerly the authors used local infiltration anesthesia, but now they feel that drop ether anesthesia is the safest. After operation special nursing care is important. The baby must be kept warm and drafts must be avoided, fluids restored, distention combated with stupes, rectal tubes and, later, enemas, pain relieved by codeine, acidosis prevented by dextrose and dressings kept dry.

BANTIN, Omaha.

SAFETY-PIN IN THE ESOPHAGUS. L. H. CLERF, Arch. Otolaryng. **24**:282 (Sept.) 1936.

The open safety-pin is a commonly found foreign body, and it usually lodges in the food passages. The author reviews the findings, symptoms, diagnosis and treatment in fifty-eight cases and cites the locations of the foreign bodies. The methods of removal are discussed, and the invaluable assistance afforded by the roentgenologist in certain cases is noted. Cases are reported, roentgenograms illustrating perforation of the esophagus are shown, and the end-results are given.

GREENWOOD, Chicago.

THE SUCCESS OF TREATING CELIAC DISEASE FROM THE STANDPOINT OF VITAMIN DEFICIENCY. C. V. RICE, Arch. Pediat. **53**:626 (Sept.) 1936.

Rice reports a case of celiac disease in a white girl 2½ years old in which he treated the condition successfully with a diet rich in vitamins, especially vitamin B.

ORR, Buffalo.

THE RAW APPLE TREATMENT OF DIARRHEA IN PEDIATRIC PRACTICE. M. P. BOROVSKY, Illinois M. J. **70**:174 (Aug.) 1936.

Following a review of the literature, Borovsky reports his experience with the raw apple treatment in twenty-three cases of enteral and parenteral diarrhea in

infants and young children. He concludes that no other single therapeutic measure has so simply and uniformly corrected such diarrheas. He believes that this treatment has a definite place in the management of diarrhea, especially when medication is refused or is difficult to administer. BARBOUR, Peoria, Ill.

CONGENITAL PYLOROSPASM. O. BARBOUR, Illinois M. J. **70**:244 (Sept.) 1936.

This report is a summary of the interpretations and conclusions made by the author during and following ten years of clinical observations of cases of congenital pylorospasm.

In certain cases atropine is a time-proved remedy for congenital pylorospasm. In other cases phenobarbital seems to be more satisfactory. In thirty-three of thirty-seven cases irradiation of the upper part of the chest seemed to give satisfactory relief. Since 1930, whole adrenal gland without or with thyroid gland has given prompt and continued relief in fifty-four cases; none of the patients in these cases required surgical intervention; each one is alive and thriving. Adequate or complete diets seem to be of distinct value if something is given to aid in the assimilation of food. An abundance of vitamins A and D seems to be especially beneficial.

The writer believes that the establishment and maintenance of an adequate supply of breast milk is even more important for babies with congenital pylorospasm than for normal infants. He also believes that the frequent changing of feedings "to find one which will agree with the baby" is particularly pernicious in cases of pylorospasm. He also deplores with Grulee the more or less general attitude of indifference of the laity and the medical profession toward the so-called minor disturbances of infancy. AUTHOR'S SUMMARY.

THE HISTOPATHOLOGY OF THE LIVER IN "INFANTILE BILIARY CIRRHOSIS." M. V. RADHAKRISHNA RAO, Indian J. M. Research **23**:69 (July) 1935.

Infantile biliary cirrhosis as seen in Indian children was studied, and five cases are reported. The histopathologic features were: uniformly distributed necrosis, an avascular edematous connective tissue network enclosing islands of liver tissue, obliteration of the hepatic veins without changes in the portal or the biliary system, disorganization of the reticulum of the sinuses near the hepatic veins and slight attempts at parenchymal regeneration. The changes are similar to those seen in toxic cirrhosis. These children have ascites. The mechanism is discussed.

SNELLING, Toronto, Canada.

JAUNDICE AND (?) HEPATIC CIRRHOSIS. REGINALD C. JEWESBURY, Proc. Roy. Soc. Med. **29**:737 (May) 1936.

A patient aged 8½ years had been well until the age of 5 years, when she began to have recurrent jaundice with abdominal pain. These attacks would last about five weeks, and the urine was said to be dark during this period, although on several occasions examination showed no bile pigments. The stools were pale in the earlier attacks but not consistently so. When the child was first seen, in July 1935, the spleen and the liver were enlarged, extending 3 and 4 fingerbreadths, respectively, below the costal margin, and they had not altered appreciably since then. No similar condition is known in the family.

The results of physical, urinary and hematologic examination are reported.

WILLIAMSON, New Orleans.

RARE FORMS OF INTUSSUSCEPTION IN OLDER CHILDREN. M. SORREL, GUICHARD and SABOURIN, Bull. Soc. de pédiat. de Paris **33**:119 (Jan.) 1935.

Four unusual cases of intussusception, one ileal, two cecal and one appendical, are described, and the conditions encountered are illustrated by sketches. All the patients were operated on, and all recovered. BENJAMIN, Montreal, Canada.

PHYSIOROENTGENOLOGIC STUDY OF AEROPHAGIA IN INFANTS: CONDITIONS OF THE INGESTION OF AIR AND OF ITS EVALUATION; THERAPEUTIC DEDUCTIONS. M. LELONG and P. AIMÉ, Bull. Soc. de pédiat. de Paris **33**:230 (March) 1935.

Roentgenographic studies were made of the normal infant's stomach before, during and after ingestion of feedings containing barium sulfate. The fasting stomach holds very little air; the air is swallowed during and not between feedings, more with liquid than with thick food. Sucking on a thumb or empty bottle is not accompanied by deglutition, and air is therefore not swallowed during the act of sucking. Air is physiologically expelled through the pylorus and not the cardia, but can be made to go through the latter and up the esophagus by posture. Regurgitation takes place as a result of distention, which sets up contraction of the gastric wall, beginning at the pyloric antrum, which forces the stomach contents in both directions; it is favored by the relaxation of the cardiac aperture and dorsal decubitus of the infant. Vomiting is accompanied by contractions of the diaphragm and of the abdominal muscles. The sensitivity of the gastric wall to distention varies in different infants and in the same infant at different times. When aerophagia is so excessive as to cause troublesome regurgitation it can be prevented by giving food through a tube inserted in the esophagus, by feeding thick rather than liquid foods and by placing the infant on the left side for half an hour postprandially to allow the escape of the air pocket through the pylorus; the infant may then be placed on the right side until the next feeding time.

BENJAMIN, Montreal, Canada.

BALLS OF HAIR IN THE GASTRO-INTESTINAL TRACT. JULES COMBY, Progrès méd., Oct. 3, 1936, p. 1513.

Occasionally infants and small children of normal mentality and older subnormal children pull out and swallow their own hair, lint from blankets and other similar stuffs. This material may become matted into balls, and when accumulated in the stomach these may be confused with tumors or an enlargement of the spleen. They may progress through the gastro-intestinal tract to be passed with the feces, or they may be arrested and cause ulceration and perforation of the intestine, with subsequent peritonitis. The general symptoms are distress, vomiting and malnutrition. When a ball of hair is in the stomach, gastrotomy for its removal is indicated. Nine cases are reported.

LESLIE, Evanston, Ill.

COINCIDENCE OF CHRONIC APPENDICITIS AND DOLICHOCOLON. L. TORRES MARTY, An. de pediat. **2**:97 (Feb.) 1935.

The difficulties of differentiating between chronic appendicitis and dolichocolon are discussed. The case is presented of a child of 4½ years who had both, the diagnosis being confirmed by operation. In dolichocolon there is more diffuse pain, usually with absence of fever, and the abdomen is more distended.

HERRON, Spokane, Wash.

PRANDIAL DIARRHEA IN THE INFANT. R. M. CALZADA RODRÍGUEZ, Arch. españ. de pediat. **20**:296 (May) 1936.

The author reports twenty cases of infantile diarrhea occurring at the time of nursing. In the majority of cases there was a history of neuropathic manifestations in the parents. Practically all of the infants were nervous and irritable. They often had eczema and dermographia. Tests for cutaneous sensitivity showed a positive reaction to histmine in the majority. Acrophagia occurred in many. The infants had frequent attacks of colic. Fluoroscopic examination revealed very strong peristaltic waves and an intense gastrocolic reflex, causing evacuation of the bowel in practically every case. Atropine and phenobarbital were the most efficient means of therapy.

SCHLUTZ, Chicago.

THE BARIUM SULFATE ENEMA IN THE TREATMENT OF INTUSSUSCEPTION. R. M. DEL CAMPO, H. BAZZANO and R. R. ZANESSI, Arch. de pediat. d. Uruguay **7**:149 (April) 1936.

The authors report eight cases of intussusception in children 5, 6, 8, 9, 12, 18 and 24 months of age in which treatment was by barium sulfate enema, with reduction in 100 per cent of the cases. In some of the cases they used slight manipulations of the abdomen. The entire progress of the intussusception in each of these cases was observed under the fluoroscope.

SCHLUTZ, Chicago.

CELIAC DISEASE. MARTÍNEZ VARGAS, Med. de los niños **36**:326 (Nov.) 1935.

A short history of celiac disease and the various terms by which it has been described are given. The disease is most common between the ages of 1 and 2 years, disappearing after the age of 12 or 13 years. The appearance of the child suggests the diagnosis: The face may be edematous; there is pallor and emaciation; the hair is dry and sparse; the nails are brittle; the arms and legs are thin, and the abdomen protrudes.

There are weakness, rapid loss of weight, lassitude, anemia, sometimes leukopenia with increase of monocytes and eosinophils, a decrease of albumin in the blood, a decrease of calcium and phosphates, and an increase of chlorides. The stools show increase of fat to a point at which it constitutes from 50 to 70 per cent of the stools, in contrast with 25 per cent in the normal child.

Treatment consists almost solely in changing the diet and replacing lost minerals. The protein is increased, and carbohydrate is used sparingly. Liberal use is made of the juice of oranges and lemons and of bananas. Tricalcium phosphate and iron are used to combat demineralization. Ultraviolet rays are also used for their general tonic effect. Ten case reports are presented.

DWYER, Kansas City, Mo.

CLINICAL VARIETIES OF CONGENITAL MEGACOLON IN INFANCY. M. PÉHU, Paidoterapia **14**:709 (Dec.) 1935.

Péhu reports four cases of congenital megacolon (Hirschsprung's disease). He divides the disease into five forms: (1) a chief form, which manifests itself very intensely in the first days of life; (2) a second common form, which generally may be observed during later infancy only; (3) a slight form, very often segmentary, which therefore concerns only a limited portion of the colon, particularly the sigmoid part; (4) a form associated with other deformations, and (5) a latent form, which is revealed suddenly by acute symptoms. In cases of chronic constipation associated with a big abdomen one always has to think of Hirschsprung's dilatation of the colon. In two of Péhu's cases the abnormal colon was associated with hypothyroidism, and in one, with an imperforate anus.

HERRON, Spokane, Wash.

PNEUMONIC PERITONITIS CURED BY MEDICAL TREATMENT. J. Bordas, Paidoterapia **14**:729 (Dec.) 1935.

Bordas reports a case of primary pneumonic peritonitis, with an acute onset but a subacute course, in which the process, after it became encysted and after the cyst was opened through the rectum, was healed by medical treatment in two months. He discusses the diagnosis and suggests that an abdominal puncture be made if necessary to reach the diagnosis. He believes that drainage should be through the rectum rather than through the abdominal wall.

HERRON, Spokane, Wash.

BILIRUBIN AND UROBILIN IN HEPATIC PIGMENTARY INSUFFICIENCY. A. L. GARCÍA, Rev. med. latino-am. **20**:731 (April) 1935.

In a series of cases of hepatic disease the bilirubin and urobilin of the blood, bile and urine were studied within twenty-four hours after onset. The conclusions are as follows: 1. The first sign of hepatic pigmentary insufficiency is an increase

in the biliary urobilin content, which results from diminished destruction of urobilinogen arriving by the portal circulation and fixed by Kupffer cells. 2. The second sign is an increase of urinary urobilin as a result of difficulty in fixation, with a slow decrease from the high point reached by the biliary urobilin. There is a parallel increase in urobilinemia and urobilinuria. 3. The third sign is a decrease in the bilirubinocholia and urobilinocholia accompanied with an increase of urobilinemia, urobilinuria and urobilinocholia. All of this is due to difficulty in fixation by the Kupffer cells and in elimination by polygonal cells. 4. The fourth sign is acholia, choluria and icterus.

DWYER, Kansas City, Mo.

EXPERIMENTAL ANEMIA AND VITAMIN B_2. G. SOTHMANN, Arch. f. Kinderh. **104:** 193 (March 29) 1935

A condition like sprue or anemia of the pernicious type developed in rats kept on a diet of goat's milk. The cause is shown not to be lack of vitamin B; the milk was found to contain an adequate amount of this vitamin for normal growth of the rats, and the anemia was not prevented by administering large amounts of the vitamin. Liver extract, on the other hand, in amounts too small to provide the vitamin B necessary for normal growth prevented the anemia.

CRANE, Chicago.

PERFORATION OF MECKEL'S DIVERTICULUM. F. VALÉR, Arch. f. Kinderh. **104:**218 (March 29) 1935.

A case is reported, with discussion of congenital diverticuli of the small intestine and their pathologic features.

CRANE, Chicago.

CONGENITAL ATRESIA OF THE PANCREATIC DUCT AND HYPERTROPHY OF THE ISLANDS OF LANGERHANS: DIAGNOSIS OF DISEASES OF THE PANCREAS. W. TILING, Arch. f. Kinderh. **106:**9 (Aug. 13) 1935.

A case is reported in which the diagnosis of atresia of the pancreatic duct was made during life. In addition there were signs of hypertrophy of the islands of Langerhans, and this condition was found at autopsy.

CRANE, Chicago.

"GLOSSOPTOSIS." A. WAGNER, Arch. f. Kinderh. **106:**118, 1935.

The severe respiratory disturbance in the condition known as "glossoptosis" cannot be explained simply on the basis of micrognathia and "glossoptosis;" the existence of developmental disturbances of other pharyngeal organs, which likewise must be regarded as branchial malformation, should also taken into consideration.

The condition known as "glossoptosis" would thus be the result of multiple developmental branchial malformations.

CRANE, Chicago.

MANAGEMENT OF APPENDICAL PERITONITIS DURING THE INTERMEDIATE AND LATE STAGES. K. RESCHKE, Beitr. z. klin. Chir. **161:**64, 1935.

Reschke compares his results with those of his predecessor.

During 1929 and 1931, under the leadership of Dr. G. R. Martens, cases of appendical peritonitis of less than forty-eight hours' duration showed the following statistics as compared with those observed by the author during the next one and a half years.

	Cases	Deaths	Mortality, Percentage
Martens	475	6	1.2
Reschke	259	3	1.1

The striking difference comes in the late cases, as follows:

	Cases	Deaths	Mortality, Percentage
Martens	52	24	46
Reschke	18	3	16

He brings out these figures to show that his conservative management in these cases is justifiable. Whereas in all cases reported by his predecessor operation was performed immediately after admission, in his cases treatment was conservative, and no patient was operated on until after an abscess had formed.

He pleads for immediate operation in cases in which the condition is of less than forty-eight hours' duration and conservative management in cases encountered more than forty-eight hours after the onset.

RUBIN, Boston.

INTESTINAL INVAGINATION. H. FUSS and L. LEURS, Beitr. z. klin. Chir. **161**: 117, 1935.

Fuss and Leurs discuss a series of thirty-five cases of intussusception, nineteen in infants. They reach the obvious conclusion that early operation is essential in infants. In older children and adults simple reduction is possible if the invagination has reached a late stage.

Since most of their cases have occurred during the spring and summer months, they wonder whether this condition has anything to do with the gastro-intestinal disturbances which are also more frequent during these seasons.

RUBIN, Boston.

RELATION OF MOTILITY AND IRRITABILITY OF SMOOTH MUSCLES IN THE INTESTINAL TRACT TO DOGIEL'S INTRAMURAL GANGLION CELL TYPES; COMMENT ON BRAUNE'S ARTICLES. K. HARTING, Jahrb. f. Kinderh. **145**:167 (Sept.) 1935.

The literature is reviewed, and the controversial points are discussed.

LANDAU, Hannibal, Mo.

MALIGNANT METASTASIZING SYMPATHICOBLASTOMA. K. RUPILIUS, Ztschr. f. Kinderh. **55**:708, 1933.

Rupilius reports the case of a 4 year old boy who was admitted to the hospital after six months of illness and who had metastatic tumors, particularly of the skull. He also had a swelling of the liver which indicated metastasis to that organ and a discoloration of the scalp that first led to a diagnosis of chloroma. Lumbar puncture and encephalography revealed nothing. The eyegrounds were normal. The autopsy showed a metastasizing sympathicoblastoma of the abdomen and metastasis in the lymph glands, liver and skeleton, particularly, the skull.

LEVINSON, Chicago.

OPEN SAFETY-PIN IN THE ESOPHAGUS AND INSTRUMENTS FOR ITS REMOVAL. WÜST, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:322 (Nov.) 1935.

Wüst reports the history of a patient who complained of pains in the region of the stomach and thought that he had swallowed a fish bone. Roentgenoscopy disclosed an open safety-pin in the esophagus. The lock of the safety-pin was broken off, and the broken branch of the pin was lodged in the wall of the esophagus. An attempt to press the branches of the pin together failed. Finally, the broken side of the pin was grasped with a spoon forceps, and the object was extracted. After reporting the patient's further history, Wüst states that the difficulties that were encountered in the extraction of the pin induced him to construct a tube for the removal of an open safety-pin. However, after its completion he found that an instrument of similar construction and application had been devised more than ten years ago by Mosher. He also points out that devices for closing an open safety-pin prior to its extraction have been constructed by Jackson, Arrowsmith, Schlemmer, von Eicken and Wagener, and he cites the literature on this problem.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

TREATMENT OF SUPPURATIVE PERITONITIS WITH SERUM. V. MAZAL, Bratisl. lékar. listy **15**:367 (March) 1935.

In patients with peritonitis due to Bacillus coli or to anaerobic organisms who were treated with Behring's serum (prepared against colon bacilli and a mixture of anaerobes) a marked decrease in the death rate and fewer complications were noted, and healing was hastened. In sixty-five cases of suppurative peritonitis, in thirty-nine of which the condition followed appendicitis and in eighteen a ruptured gastric ulcer and in eight was of other origin, there were eight deaths. The serum was used intraperitoneally in doses of from 20 to 40 cc. Doses of 20 cc. are used prophylactically, injected by the intraperitoneal route, in surgical operations on the gastro-intestinal tract.

STULIK, Chicago.

VALUE OF THE PUNCTURE IN THE DIAGNOSIS OF PNEUMOCOCCIC PERITONITIS. E. KUBÁNYI, Orvosi hetil. **80**:951 (Oct. 3) 1936.

When one cannot decide from the anamnesis whether pneumococcic peritonitis or appendicitis is the cause of the illness one should make at McBurney's point a small opening and aspirate a small amount of fluid for diagnostic purposes. If the bacteriologic examination establishes the presence of pneumococci, one should not operate but wait for the formation of an abscess.

GÖTTCHE, Budapest, Hungary.

APPENDICITIS IN CHILDREN. A. C. BRODSKY, Azov-Black Sea Regional Pub. Co., symposium 3, article 6, 1935.

The shape, position and structure of the appendix as observed in children are discussed. Appendicitis was found to be more frequent in girls than in boys. The greatest influence on the incidence was not in respiratory infections but in the general condition. Diets high in protein seemed to increase the percentage of cases. The length of the appendix bore only a slight relation to the incidence. Foreign bodies seemed to be important in causing closure of the proximal end of the appendix. A clinical and pathologic discussion of appendicitis in children is presented.

SEMENENKO-MCKHANN, Boston.

BACTERIOLOGY OF APPENDICITIS IN CHILDREN. A. C. BRODSKY and G. H. GHASKIN-MUNDER, Azov-Black Sea Regional Pub. Co., symposium 3, article 7, 1935.

In seventeen cases the clinical picture, microscopic aspects and bacterial contents of the appendix were studied. It was found impossible to assume a specific originator of one or another of the clinical, pathologic or histologic types of childhood appendicitis. Bacteria of several types, mostly of enteral origin, were found associated with this disease.

SEMENENKO-MCKHANN, Boston.

A NEW EARLY SIGN OF PERITONITIS. A. L. FISANOVICH, Vrach. delo **18**:1015, 1935.

Fisanovich presents a sign of early peritonitis which, he found, had not been mentioned in the literature.

The new sign or symptom, to which he refers as the sign of "raising and lowering," consists in an increase in the abdominal pain on passive elevation of the patient's trunk and a decrease on lowering the trunk. The sign is best elicited as follows: The patient is made to lie on his back with his arms crossed on his chest. The physician, with his hand placed on the posterior aspect of the patient's head and neck, raises him slowly to a sitting position and then rapidly lowers him to the original position.

In nineteen patients this sign was found to be practically pathognomonic of early peritonitis. Moreover, Fisanovich believes that its absence is a definite contraindication to surgical intervention. Four cases are presented which illustrate and prove this contention.

He likewise states that in cases of ileus not yet complicated by peritonitis the opposite has been observed, i.e., a diminution of the abdominal pain on raising and an increase on lowering the patient.

He believes that the aforementioned sign is identical in its nature and mechanism with Blumberg's sign of peritonitis.

BODER, Los Angeles.

Nervous Diseases

MEGALO-MYELO-ENCEPHALY: REPORT OF CASE WITH DIFFUSE MEDULLOBLASTOSIS. A. FERRARO and S. E. BARRERA, Am. J. Psychiat. **92**:509 (Nov.) 1935.

An unusual case of megalencephaly, with few symptoms in life, is reported by Ferraro and Barrera. The patient was born late and weighed 16 pounds (7,257 Gm.) at birth. During childhood he had visual difficulties, nosebleed and repeated temper tantrums. At the age of 9 years his head was 2½ inches (6.4 cm.) greater in circumference than the normal, and he had nystagmus, strabismus and undescended testes. At the age of 12 there were a feminine habitus, enlargement of the head, an intelligence quotient of 86, a negative Wassermann test and white plaques in the macula. The following year the patient had a sudden attack of pneumonia, during which he was drowsy and presented a Babinski sign bilaterally; he died after an attack of projectile vomiting.

Autopsy revealed a fibrous mass in the chest, behind the aorta, which was connected with the sympathetic ganglions. The brain weighed more than 2,000 Gm., and the cerebellum was proportionately even more enlarged. The hypertrophy extended throughout the brain stem and the upper part of the spinal cord. A persistently thick external granular layer was observed in the cerebellum, and there was an abnormally wide molecular layer between this and the internal granular stratum. The cerebral cortex was thickened, particularly in the first, second and fourth layers. Throughout the cortex were many satellite cells, probably oligodendroglia cells. In the white matter were many nerve cells. Ferraro and Barrera suggest that these are persistent embryonic structures and that they are capable of giving rise to tumors of the brain. It is concluded that while there is an element of neoplastic potentiality in these structures, the basic process is essentially one of retained embryonic development.

DAVIDSON, Newark, N. J. [ARCH. NEUROL. & PSYCHIAT.]

BRAIN TUMORS IN CHILDREN. CHARLES H. FRAZIER, Arch. Pediat. **53**:295 (May) 1936.

Tumors seen in childhood vary in type from those seen in adult life. Glioma, astrocytoma, ependymoma, medulloblastoma, teratoma, tumor originating from a congenital anlage, such as tumor of the hypophysial duct ,and tuberculoma, are the most common in childhood. Glioma represents about 50 per cent of all tumors. Ten major groups are recognized, and the astrocytoma is by far the most prevalent. Astrocytoma is invariably found in one or the other cerebellar hemisphere. The characteristic feature of astrocytoma is cyst formation. Frazier stresses the danger of a lumbar puncture in cerebellar tumor and the tendency to herniation through the foramen magnum. Artificial respiration and immediate suboccipital decompression are necessary when herniation occurs.

Medulloblastoma develops almost invariably in children, taking its origin just over the fourth ventricle. They are midline tumors and a ventricular block occurs early in the course of the tumor. Headache and vomiting may be the only manifestations. They may metastasize to the spinal cord.

Another type of tumor that is described by the author is that which develops from the epithelial rests in the hypophysial duct. The tumor is located above the hypophysis between the hypophysis and the third ventricle. Tumor of the hypophysial duct produces atrophy of the optic nerve and defects of the visual fields because of its proximity to the optic chiasm and tracts. The tumor frequently becomes calcified and may be detected by the roentgenogram. Several case reports are also given.

ORR, Buffalo.

EXPERIMENTAL ENCEPHALOGRAPHY WITH ANESTHETIC GASES. ROBERT B. AIRD, Arch. Surg. **32**:193 (Feb.) 1936.

Owing to the fact that the injection of air into the ventricles is a painful and trying ordeal for the patient, Aird points out that various workers are seeking other methods of encephaloventriculography. The selection of various gases was employed for this purpose. Dogs were utilized for Aird's study. The injections were generally made through a lumbar puncture. The following gases were employed in the experiments: ethyl chloride, divinyl chloride, ether, vinyl chloride, acetylene, oxygen, nitrous oxide, ethylene and cyclopropane. All the gases except the last four mentioned proved unsatisfactory for encephalographic uses, because they are decidedly dangerous. In a limited series of experiments the effects of oxygen and those of cyclopropane appeared to be definitely superior to those of air. The best results were obtained with nitrous oxide and ethylene. They were found to be safe, gave good roentgenographic results and little irritation but acted as sedatives and had no ill effects. KAISER, Rochester, N. Y.

RECURRENT CRANIAL NERVE AND SPINAL PARALYSIS ASSOCIATED WITH HERPES. W. G. WYLLIE, Proc. Roy. Soc. Med. **29**:744 (May) 1936.

The patient was a boy of 7½ years. Since the age of 4½ years he had had three attacks of paresis of the right third nerve, two attacks of facial paralysis on the left side, facial weakness on the right side and paresis of the muscles of the left arm innervated from the sixth and the seventh cervical segment. With the exception of the first attack, the herpes has always appeared on the right side of the chin, usually a few days after palsies of the cranial nerve have developed but preceding the paralysis on one occasion. The previous history and the sequence of events are given in the report.

WILLIAMSON, New Orleans.

CEREBELLAR ATAXIA (MARIE'S ATAXY). T. STANLEY RODGERS, Proc. Roy. Soc. Med. **29**:747 (May) 1936.

Cerebellar ataxia occurred in a girl of 11 years. There was no history of disease of the nervous system in the family. The cerebrospinal fluid was normal, and the Wassermann reaction was negative. The patient had been in bed with measles and pneumonia for three weeks at the age of 3 years. From that time she had been unsteady in her movements. An account of the physical examination on admission to the hospital concludes the report.

WILLIAMSON, New Orleans.

HYPERTHERMIA OF OBSCURE ORIGIN WITH SPASMOPHILIA. KADRI RACHID, Arch. de méd. d. enf. **39**:107 (Feb.) 1936.

Fever of unknown origin in nurslings has been attributed to disequilibrium in water metabolism and a proportional insufficiency of other elements in the food, such as albumin, sugar and sodium chloride; occasionally the use of dried milk has been held responsible. The physiologic genesis of the hyperthermia, however, has never been satisfactorily explained; infants affected may continue to gain in weight and to appear to be in normal health, apart from the abnormal temperature.

Rachid reports a case studied in Istanbul; a baby girl of 6½ months entered the clinic from Thrace on Sept. 4, 1934, with a history of diarrhea of several days' duration followed immediately by fever, constipation and convulsions. Examination revealed a temperature of 39.5 C. (103.1 F.); the infant was prostrated and the convulsive seizures recurred frequently; the fontanel was greatly depressed. Further inquiry showed that the mother's milk was entirely insufficient, only 20 cc. being expressed from each breast. It was obvious that the patient was suffering from a starvation diet, and suitable complementary feeding was immediately established. Meantime clinical investigation was continued, and malaria, tubercu-

losis and dysentery were excluded. Within four days the convulsions were fewer and less intense, but the temperature averaged 39 C. (102.2 F.), and Trousseau's sign was present; daily subcutaneous injections of a preparation containing calcium and vitamin D were begun.

After the second injection, both the fever and the seizures disappeared. During the next week the patient gained 50 Gm. daily and was discharged in excellent health on September 23. She was returned to the hospital on November 19 in a state similar to that at the first admission. The same treatment was followed for ten days, with apyrexia following, and complete cure was effected. Rachid expresses the belief that at least a percentage of unexplained hyperthermia in nurslings is due to a low calcium content of the cells of the thermoregulatory center similar to that found in other nerve centers during attacks of spasmophilia.

AMESSE, Denver.

MENINGIOMAS IN CHILDREN. T. DE MARTEL and J. GUILLAUME, Rev. neurol. **64**:699 (Nov.) 1935.

A case of meningioma in a child of 10 years is presented. The clinical symptoms had appeared very rapidly. Focal signs were absent, but the ventriculograms were diagnostic. The tumor, which weighed 280 Gm., was successfully removed.

DAFFINEE, Boston.

CEREBRAL CHANGES IN MONGOLIAN IDIOCY. S. LEVI, Riv. di clin. pediat. **34**:769 (Sept.) 1936.

Levi has made careful anatomic studies of the brains of five mongolian idiots. He draws the following conclusions:

1. No gross abnormality, no inflammatory factor, and no abnormality of the brain substance, either diffuse or localized, was found to explain mongolism.

2. The weights of the brains were less than those of normal persons of the same age and sex.

3. The relative development of the frontal lobes was less than normal.

4. The cerebral cortex showed diminished development and differentiation from normal.

5. The brains suggested biologic reversion toward those seen in lower primates.

This article includes an extensive bibliography and a discussion of the genesis of mongolism.

HIGGINS, Boston.

THE USE OF CHRONAXIA IN INFANTILE TETANY. J. R. MARCOS and R. IRIGOYEN, Arch. de pediat. d. Uruguay **7**:160 (April) 1936.

Marcos and Irigoyen give a short review of the literature on this procedure, which they consider the most accurate means of measuring excitability of nerves. They report their observations in a case of tetany in which this method was used.

SCHLUTZ, Chicago.

FOERSTER'S SYNDROME. M. SCHACHTER, Arch. de pediat. d. Uruguay **7**:338 (Aug.) 1936.

Schachter reports a case in a 5 year old Jewish girl, who had shown evidences of faulty mental and physical development since the age of 2. The birth and family history did not suggest any cause. The child was an idiot and could stand and walk only with support. The gait closely resembled that in cerebellar ataxia. She had definite choreo-athetoid movements of the fingers. The facial expression was masklike, and there was complete deafness. The most striking thing was marked atonia of the muscles of the extremities when the patient was in the sitting or recumbent position. This abruptly changed to definite rigidity of the extensors when the child assumed the erect posture. There were no muscular

atrophies. The Babinski sign was positive, and the tendon reflexes were hypoactive. At times the child exhibited maniacal outbreaks, accompanied by loud screaming.

Treatment with barbiturates and tonics and general hygienic measures were without result. Schachter points out the wide variety of pathologic lesions observed at necropsy in such cases and discusses the etiologic possibilities and the inefficiency of treatment.

SCHLUTZ, Chicago.

CEREBRAL PSEUDOTUMOR. R. CHARLONE, Arch. de pediat. d. Uruguay **7**:345 (Aug.) 1936.

Three cases are presented: The first was that of a 9 year old boy with increased intracranial pressure, manifested by generalized convulsions, headache, vomiting, marked papilledema and almost complete blindness; there were no signs of localization. He recovered completely in nine months without decompression and remained free from symptoms for seven years. There was a family history of epileptiform attacks in two younger brothers and in four of six maternal uncles. The latter group recovered at puberty.

The second case was that of a 5 year old boy who showed symptoms of intracranial hypertension: headache, vomiting, bilateral papilledema and separation of the cranial sutures. These followed an attack of meningismus during an acute attack of suppurative otitis media on the right side. There was weakness of the internal rectus muscle. Craniotomy was performed and was followed by complete recovery in five months.

The third case was that of a boy 4½ years old with a cerebellar syndrome: ataxic gait, nystagmus, intention tremor (sometimes generalized) and symptoms of increased pressure within the cranial cavity. The eyegrounds were normal. He had a severe accident following a lumbar puncture but gradually recovered from this. The only sequela was slight impairment of mentality.

In none of these cases was there any alteration of the spinal fluid.

Charlone discusses the characteristics of the condition (Nonne's syndrome) and suggests as conservative a therapy as possible. Repeated lumbar punctures are indicated to avoid craniotomy, in the hope of spontaneous recovery. Only if this fails does he recommend decompression.

SCHLUTZ, Chicago.

TETANY IN A FIFTEEN MONTH OLD CHILD. MARCELLO GARCIA, J. de pediat., Rio de Janeiro **3**:414 (Sept.) 1936.

This is a quite rare occurrence in Brazil. There was no apparent factor to account for the condition. The blood calcium was 7.8 mg., and the alkaline reserve was normal. Photographs are shown of carpopedal spasm and Chvostek's reaction. Recovery was prompt on treatment with ultraviolet rays.

SANFORD, Chicago.

ANATOMICOPATHOLOGIC STUDIES ON THE PATHS OF PROPAGATION OF RHINOGENIC MENINGITIS. J. JACOBSGAARD, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:387, 1936.

Jacobsgaard reemphasizes Hajek's statement that only histologic examination will demonstrate definitely the paths of propagation of rhinogenic meningitis. He thinks that the failure to realize this necessity accounts for the fact that so many of the investigations on this problem have failed to obtain reliable results. Another shortcoming of many of the studies was that they were made on patients who had undergone surgical intervention on the nasal sinuses shortly before death.

Since an operation causes considerable changes, the author decided to investigate the paths of propagation in patients who had not been operated on. He describes clinical and anatomicopathologic studies on six patients with rhinogenic meningitis. He was able to prove histologically that the lymph sheaths of the fibers of the olfactory nerve and the perforating osteomyelitis of the walls of the accessory nasal sinuses are the paths of propagation of rhinogenic meningitis.

Histologic studies proved also that there are instances of epidemic meningitis in which the propagation is likewise effected by way of the lymph sheaths of the fibers of the olfactory nerve. EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

THE FILLING OF CYSTIC BRAIN TUMORS WITH AIR. I. FÉNYES and P. KISS, Orvosi hetil. **80**:198 (Feb. 29) 1936.

Not only does the localization of a tumor of the brain often give difficulty, but one has always to reckon with the possibility that there is hydrocephalus without any tumor. The best means of deciding which of the two is present is to make a diagnostic puncture in the suspected region of the brain. Since in many cases a tumor of the brain shows cystic degeneration, one can often get fluid, but one has always to think of the possibility of a subarachnoid cyst. The protein content of a subarachnoid cyst is low, nearly as low as the protein content of the cerebrospinal fluid, but the protein content of a tumor cyst is much higher—from 4 to 6 per cent. It is expedient to blow air into the place at which the cerebrospinal fluid has been tapped to restore the preceding pressure, and then one can localize the tumor by roentgen examination. GÖTTCHE, Budapest, Hungary.

TUMORS OF THE CEREBELLUM WITHOUT CHANGES IN THE CEREBROSPINAL FLUID. I. FÉNYES and P. KISS, Orvosi hetil. **80**:251 (March 21) 1936.

Three cases are reported, demonstrating that a cerebrospinal fluid with the normal consistence does not exclude the possibility of a tumor of the brain.

GÖTTCHE, Budapest, Hungary.

I. PROTEIN FRACTIONS OF THE CEREBROSPINAL FLUID OF CHILDREN. P. UJSÁGHY, Orvosi hetil. **80**:443 (May 9) 1936.

The cerebrospinal fluid of premature infants is characterized by a diminished increase of the whole protein content and especially by an increase of globulins. The conditions usual at a later age develop about the sixth month. The infants who are born at full term show the same condition as the premature infants, but they present the later values in the third month. The whole protein content is from 18 to 26 mg. per hundred cubic centimeters. The albumin content is three fourths, the globulin content one fourth, of the whole protein content.

GÖTTCHE, Budapest, Hungary.

II. PROTEIN FRACTIONS OF THE CEREBROSPINAL FLUID OF CHILDREN. P. UJSÁGHY, Orvosi hetil. **80**:489 (May 23) 1936.

The whole protein content of the cerebrospinal fluid is much increased in meningitis. In the beginning the albumins are increased, later the globulins. The fibrinogen content increases to such an extent that it can be measured. The whole protein content is increased in encephalitis, but the behavior of the fractions varies. With tumor of the brain, epilepsy and chorea minor there are normal values. With idiocy and imbecility the value of the whole protein content is at or below an inferior normal level. GÖTTCHE, Budapest, Hungary.

ASEPTIC MENINGITIS PURULENTA. J. WIRTH, Orvosi hetil. **80**:466 (May 16) 1936.

Wirth observed five cases, all in infants. He describes one case in detail: An 8 month old infant showed all the common symptoms of meningitis following influenza. The cerebrospinal fluid was turbid and there were many polymorphonuclear cells in it. The lumbar puncture was repeated three times; the alterations remained the same, but bacteria could not once be found. The infant was taken home in thirty-six days, totally recovered, and reexamination two years later did not show any pathologic alterations of the nervous system.

GÖTTCHE, Budapest, Hungary.

Psychology and Psychiatry

CHILD GROWTH AND EMANCIPATION. F. J. FARNELL, Arch. Pediat. **53**:630 (Sept.) 1936.

The failure of many adults to enjoy a harmonious adjustment in society may be traced to early childhood training. The family, school and church have failed in not permitting children to attain the sense of reality. They allow them to grow up and face a world that assumes because men and women are mature physically they have emancipated themselves from their childhood dependence.

ORR, Buffalo.

THE SCOPE OF THE PROBLEM OF DELINQUENCY AND CRIME AND THE CONTRIBUTIONS OF PSYCHIATRY. G. M. LOTT, J. Crim. Law & Criminol. **26**:61, 1935.

A study was made of 407 cases referred to the Rhode Island State Public Welfare Commission's psychiatric clinic. The subjects were of both sexes and of all ages and conditions and included dependent and delinquent children, repeated offenders and "long termers": 41.5 per cent were juveniles; only 13.5 per cent were from the community, the rest being in institutions; 9 per cent had serious physical disabilities, and feelings of insecurity, inadequacy, rejection and difference were prominent; 34 per cent could be sent back into the community; 35 per cent needed prolonged institutional or other treatment, and 14 per cent were abnormal but did not suffer from any psychosis; two thirds of these were definitely mentally defective. Lott presents a prognostic classification into four groups: (1) persons who can be readily adjusted in or returned to the community—probational material; (2) persons requiring institutional or other treatment, with a doubtful prognosis; (3) persons mentally or emotionally abnormal within the limits of sanity and (4) persons requiring care in a hospital for patients with mental diseases. From the point of view of prognosis the predominant number of adults were in the group of persons with a doubtful prognosis, while over three fourths of the juveniles were in the group with a good prognosis. The intelligence of each subject in each group was tabulated, and it was found that persons with an intelligence quotient of 100 or over and persons intermediate between these and the persons with mental deficiency predominated in the group with a good prognosis, while the mentally deficient patients were to a great extent in the group with a doubtful prognosis or emotional abnormality. The prognosis for adults tended to be less satisfactory than that for young persons in the same groups. The group of persons with intermediate intelligence embraced 42 per cent of the subjects. Lott points out that psychiatry can contribute a method of approach to the cure of a concealed twist in the personality or other cause of unacceptable behavior. Economic adjustment of persons released from institutions can be the function of a clinic, and the clinic may aid in the selection of material for probation and parole. In one state 34 per cent of the patients presenting the worst problems could be fitted back into the community. Lott urges further use of psychiatry clinics and the collection of data from clinics assigned to juvenile and other courts, from probation, parole and children's bureaus, juvenile and adult corrective schools, jails and prisons in dealing with the problem of crime.

SELLING, Detroit. [ARCH. NEUROL. & PSYCHIAT.]

HOW THE MONTEFIORE SCHOOL PREVENTS CRIME. E. H. STULLKEN, J. Crim. Law & Criminol. **26**:228, 1935.

The Montefiore School, Chicago, is one of two new special schools for truant and problem boys. It was opened in September 1929 and enrolls 510 boys, who are from 10 to 17 years of age. Classes do not average over 25 boys. The Chicago Board of Health furnishes the school with medical and dental services. A full time psychologist is assigned to the school by the Bureau of Child Study. There is a special teacher of speech. Individual work is done with groups of

boys having pronounced disability in reading and arithmetic, and all are given diagnostic tests to determine the difficulties. Attendance in the school has been over 89 per cent, in spite of the fact that 65 per cent of the boys were habitual truants before being sent there. Less than 18 per cent of the boys have had to be taken to the juvenile court. Approximately 500 boys have been saved from a court experience, and 350 boys have been saved from a parental school or institutional experience in the past five years. The school has attempted to create in its staff a mental hygiene point of view, in an effort to keep psychiatric principles an integrated part of the school system. Behavior difficulties among the children are carefully analyzed. The school curriculum is made more elastic, and difficulties in special subjects are corrected in order to enable a student to escape from a feeling of inferiority. The school tries to build up all conditions which tend to increase peace and satisfaction.

SELLING, Detroit. [ARCH. NEUROL. & PSYCHIAT.]

AMAUROTIC FAMILY IDIOCY (TAY-SACHS' DISEASE). A. G. MAITLAND-JONES, Proc. Roy. Soc. Med. **29**:742 (May 1936.

A girl aged 14 months at the time of examination was born at full term and developed normally up to 8 months, but after that time she gradually retrogressed, becoming weaker in the back and more helpless. The parents stated that there was no mixture of Jewish blood. They were first cousins.

Ophthalmoscopic examination showed the typical changes seen in Tay-Sachs' disease.

WILLIAMSON, New Orleans.

A SPECIAL FORM OF FEEBLEMINDEDNESS ASSOCIATED WITH MYOSCLEROSIS: CONTRIBUTION TO THE STUDY OF MENTAL DISTURBANCES ACCOMPANYING MYOPATHY. C. BERLUCCHI, Riv. di pat. nerv. **44**:453 (Nov.-Dec.) 1934.

Berlucchi describes a special form of feeblemindedness associated with myosclerosis, which he considers to be related to the forms of muscular dystrophy. He asserts that muscular dystrophy is a disease involving not the muscular system alone but various other organs and systems. Many patients with muscular dystrophy are free from mental complications. In a small number of cases, such as those Berlucchi describes, the mental disturbances are much more serious and assume the character of extreme feeblemindedness. In such cases the muscular dystrophy has a rapid course, and severe involvement of the lower extremities with flexion attitudes often results, accompanied by marked muscular retraction. Pseudodystrophy in these cases is not striking.

A few cases of feeblemindedness of this type associated with myosclerosis are described in the literature, but the condition has never been studied from the pathologic standpoint, nor has it been clearly differentiated from other forms of feeblemindedness associated with motor disturbances.

Berlucchi concludes that the entity which he describes differs from forms of idiocy associated with cerebral lesions for the following reasons: (1) Several cases of feeblemindedness associated with myosclerosis have appeared in families in which other members were afflicted with common forms of muscular dystrophy, and (2) in the cases in his series characteristic pathologic changes occurred. The variety he reports should, in his opinion, occupy an autonomous position in the group of cases of arrested mental development.

The involvement of the mental processes is severe from earliest infancy. On the other hand, the symptoms of muscular dystrophy manifest themselves generally after the seventh year. Before the age of 7 years the patient is considered to have advanced feeblemindedness. As additional symptoms Berlucchi reports high blood pressure and disturbances in the vegetative mechanisms, leading to pronounced vasomotor imbalance.

From the pathologic changes he concludes that the motor disturbances are the result of primary involvement of the muscular system. The pyramidal tracts and cells of the anterior horns are not severely involved. On the basis of the data

given, he considers himself justified in establishing a special form of feebleminded-ness associated with myosclerosis which belongs to the common group of muscular dystrophy and is distinct from the usual forms of idiocy.

FERRARO, New York. [ARCH. NEUROL. & PSYCHIAT.]

TWO CASES OF IMITATION. B. SORIA, Arch. de pediat. d. Uruguay **6**:509 (Dec.) 1935.

Soria presents two cases of imitation, one in a child 2½ and the other in a child 5 years of age. The first child had a history of severe pain in the hip, which had begun suddenly, and inability to walk. There was marked tenderness in the region of the hip joint. Roentgenographic examination disclosed nothing. The second child had periodic attacks of severe headache and vomiting without any organic basis to explain them in spite of an extensive work-up. The author discovered the imitation in both children and cured them by psychotherapy.

SCHLUTZ, Chicago.

NARCOLEPSY IN CHILDHOOD. E. VON LEDERER, Arch. f. Kinderh. **107**:11, 1935.

Two cases are presented, one of symptomatic and one of genuine narcolepsy. Good symptomatic results were obtained from the administration of ephedrine.

CRANE, Chicago.

WRITING PRESSURE OF TWINS. M. CARMENA, Ztschr. f. d. ges. Neurol. u. Psychiat. **152**:19, 1935.

Twenty-nine pairs of identical (uniovular) twins and twenty-one pairs of non-identical (biovular) twins were studied with reference to similarity in pressure while writing, which was recorded by a kymograph. The similarity was significantly more noticeable in the case of the identical twins, especially the males; the females showed similarity, but it was not as great. The method of learning to write was the same for both sets of twins; the vocations were different for only seven pairs. The conclusion is drawn that hereditary predisposition plays an important part in the regulation and intensity of the movements and of the tonus of the muscles of the arms and hands (movements of an involuntary and automatic nature).

MICHAELS, Boston. [ARCH. NEUROL. & PSYCHIAT.]

Diseases of the Genito-Urinary Tract

DOUBLE PENIS AND DOUBLE BLADDER, WITH REPORT OF A CASE. R. M. NESBIT and W. BROMME, Am. J. Roentgenol. **30**:497 (Oct.) 1933.

Diphallus has been reported in forty-five instances in the past three centuries. The various theories suggested concern atavism, teratoid structures, such as double monsters, and duplication to a minor degree in the embryo, the anomaly being then in the same classification with supernumerary digits. The double bladder was demonstrable in the roentgenogram. The most plausible idea seems to be that since the entire urogenital tract, with the exception of the apex of the bladder, is derived from the urogenital sinus, which is derived from bilateral anlagen, failure in fusion prevents the final development of single organs and leads to anomalies as described.

STULIK, Chicago.

PYELONEPHRITIS IN THE NEW-BORN. J. S. HUNT, Arch. Pediat. **53**:341 (May) 1936.

Pyelonephritis is unusual in the newly born infant. Hunt reports a case occurring in a boy. Six hours after delivery the temperature was 103 F. It

returned to normal on the fifth day and remained so until the twelfth day, when a rise to 106 F. was followed by repeated attacks of cyanosis. He died on the thirteenth day. No definite evidence of pyuria was noted until the twelfth day.

Necropsy revealed numerous abscesses in the left kidney. The left ureter was dilated in its upper two thirds. A definite stricture was found at the junction of the middle and the lower third. The right ureter was dilated in the middle and lower thirds. Small gram-negative bacilli were isolated from the left kidney. Cultures obtained from the heart blood and peritoneal fluid produced a pure growth of Bacillus coli.

ORR, Buffalo.

THE COPPER CONTENT OF THE URINE OF NORMAL CHILDREN. ALAN ROSS and I. M. RABINOWITCH, J. Biol. Chem. **111**:803, 1935.

Copper is a normal constituent of urine, the amounts in adults ranging from a mere trace to 0.4 mg. per liter. In view of the importance generally attached to copper in the metabolism of iron (formation of hemoglobin, etc.) and its widespread and increasing use in diseases of children, it was considered of importance to ascertain the normal urinary excretion of copper in children. In boys from 8 to 17 years of age it varied from 0.04 to 0.52 mg. per liter and from 0.026 to 0.62 mg. a day. It is of interest that the brain also contains rather large amounts of copper. It is especially rich in the fetal brain.

PAGE, New York. [ARCH. NEUROL. & PSYCHIAT.]

RENAL RICKETS AND DWARFISM. BRUCE CHOWN, Brit. J. Surg. **23**:552 (Jan.) 1936.

Chown cites cases of renal rickets occurring in sisters at the age of 6½ weeks and 5 weeks. These infants had a history of not growing or gaining weight. There were hypercalcemia, calcium casts in the urine, deposits of calcium in the renal lymphatics and focal necrosis in the kidney, and the elder one had pyelonephritis. Chown expresses the belief, as Harris and Hutinel did, that this condition is a pituitary dysfunction, this belief being based on the finding of a malformed pituitary body on postmortem examination. He expresses the belief that nephritis is not primary but is secondary to an abnormal mineral metabolism which is the result of faulty growth of bone. According to the author, all the symptoms can be produced by pituitary dysfunction.

SUMMERFELDT, Toronto, Canada.

INTRAVENOUS PYELOGRAPHY IN A SERIES OF CASES AFTER TRANSPLANTATION OF THE URETERS. G. GREY TURNER and JAMES H. SAINT, Brit. J. Surg. **23**:580 (Jan.) 1936.

The condition of patients in whom the ureters have been transplanted into the sigmoid flexure of the colon presents two aspects of considerable interest and importance. The first concerns the pathologic changes which may take place in the upper part of the urinary tract and their effect on renal function, and the second, the rôle played by the large bowel in the storage of urine. In a previous paper on a follow-up study of seventeen cases with transplantation of the ureters it was found that these patients showed no evidence of gross renal insufficiency. To ascertain more exact information on changes that might have occurred in the upper part of the urinary tract and to investigate to what degree the colon acts as a reservoir, neo-iopax was given intravenously and roentgenograms were taken at the end of five minutes, thirty minutes, one and one-half hours and six hours. All except one of the six patients examined had either bilateral or unilateral dilatation of the upper part of the urinary tract. In every case the kidney was a functioning organ, although in some it was impaired. It was also found that urine had collected in the rectum at the end of half an hour. In four cases the urine had found its way as far back as the cecum by the end of the sixth hour, and in another it had risen to the level of the splenic flexure.

SUMMERFELDT, Toronto, Canada.

THE PROBLEM OF ANURIA: A REVIEW OF RECENT WORK ON RENAL PHYSIOLOGY, WITH REPORTS OF TWO CASES. ALAN W. CUBITT, Brit. J. Surg. **24**:215 (Oct.) 1936.

In this paper are presented two cases of anuria. In one case the condition was due to a calculus in the left kidney. Roentgen examination revealed a dense right kidney. The patient recovered without operation. Physiologic solution of sodium chloride was given intravenously, reenforced with 10 cc. of a 20 per cent salt solution once during the treatment. In the second case the condition was due to a sudden intense toxemia following acute infection. The patient was treated by spinal anesthesia.

Anuria is fully discussed from the historical, anatomic and physiologic points of view. From the information obtained the following outline may be offered:

Factors That Seem To Determine the Output of Urine.—1. Urinary pressure. This is normally nil but may rise as a result of partial or complete obstruction of either the ureter or the tubules. Obliterative pressure on the tubules is one of the effects of venous obstruction.

2. Changes in the secretion-reabsorption activity of the tubule cells. Precise knowledge of this activity is still lacking, but it appears probable that the process depends, like other secretory processes, on the supply of blood to the cells. There are also indications, previously discussed, that it is modified by the pressure of the urine.

3. Blood pressure in the glomerular capillaries. This pressure, less the osmotic pressure of the serum proteins and the pressure of the urine, is the effective filtration pressure. It is increased by (*a*) rise in the general blood pressure, (*b*) relaxation of the afferent arterioles and (*c*) contraction of the efferent arterioles.

4. Area of the capillary bed from which filtration is taking place. This depends on the state of contraction or relaxation of the afferent and efferent arterioles and on the general blood pressure. In a kidney under normal conditions only a small number of the glomerular capillaries are open to blood flow; the number is greatly increased during diuresis, and under other conditions it may be diminished.

5. Osmotic pressure of the colloids in the plasma of the blood contained in the glomerular capillaries. It is probable that if any change occurs it is of so slight a degree as to be negligible in its effect on the filtration of the urine.

Causes of Anuria.—1. Urinary pressure. Increased pressure of urine is caused by obstruction of the ureter or of the tubules. Obstruction of the tubules is a result of venous obstruction, and one may assume that it is also a result of rise in intrarenal pressure due to edema of the renal parenchyma.

2. Arterial disturbances, such as (*a*) marked fall of the general blood pressure and (*b*) contraction of afferent arterioles.

3. Venous disturbances, such as obstruction of the veins.

SUMMERFELDT, Toronto, Canada.

TREATMENT OF ENURESIS WITH LARGE DOSES OF ANTERIOR PITUITARY EXTRACT. G. CAIN, Bull. Soc. de pédiat. de Paris **33**:93 (Jan.) 1935.

A special liquid extract of the anterior lobe of the pituitary gland, of which 1 tablespoonful corresponded to 0.3 Gm. of anterior lobe, was given by mouth in progressively increasing doses to sixty children with enuresis. Daily doses, starting with 0.1 Gm. for a 2 year old child and increasing weekly up to a final dose of 0.8 Gm. and even more for adolescent children, were administered over a number of weeks. When untoward symptoms of intolerance developed, the daily dose was diminished or omitted for a time. After a cure was obtained, the treatment was continued for one week of two, then one of three, for three months. Forty-five boys and fifteen girls comprised the group. Twenty-five patients had just completed the treatment and are not included in this report, leaving thirty-five, of whom eighteen were cured, fourteen improved and three unaffected. In a number of instances several children of one family were treated. Marked loss of weight

was an indication for decreasing the dose, and fecal incontinence, which occurred in two cases in which failures were listed, constituted another reason for temporary interruption of the treatment. In some cases a cure was obtained after a week or two or even after one day of medication; in these, the author remarks, the pituitary extract acted as a specific. No mention is made of mental hygiene as an aspect of the problem.

BENJAMIN, Montreal, Canada.

COLON BACILLUS INFECTIONS IN CHILDREN. SCHOEN, Bull. Soc. de pédiat. de Paris **33**:133 (Jan.) 1935.

Reports on nine children with colon bacillus infections of the urinary tract are presented. There were three boys and six girls. The diagnosis was made by the finding of numerous bacilli in a fresh drop of urine. Cultures of the urine are considered of no significance. In three of the cases the colon bacilli were associated with enterococci; in one, with streptococci, and in one, with tubercle bacilli. It is believed that infection of the urinary tract may be (1) ascending or (2) hematogenous, and that a poor general condition of the child may allow the infecting organisms to gain a hold. In the treatment more is to be expected from attention to improvement of the general condition than from administration of antiseptic drugs. It is pointed out that when the condition is refractory one should look for tuberculous infection, especially by inoculating the urine into guinea-pigs, or for congenital malformations of the urinary tract.

BENJAMIN, Montreal, Canada.

ACUTE COLON BACILLUS INFECTION IN AN INFANT; EFFICACY OF PASTEUR INSTITUTE COLON BACILLUS ANTISERUM. RAILLIET and GINSBOURG, Bull. Soc. de pédiat. de Paris **33**:140 (Jan.) 1935.

A girl 6 months old had severe colon bacillus infection with marked pyuria. It is thought that the infection was due to contamination from the mother by way of the mouth during birth. During the acute stage of the disease the infant was given 20 cc. of colon bacillus antiserum subcutaneously. This was followed by temporary improvement, but the pyuria did not completely clear up. There was some serum sickness and, four weeks after the administration of the serum, an abrupt rise in temperature. It is believed that the recurrence of pyrexia coincided with exhaustion of the antibodies which were introduced into the body by the serum. Further treatment consisted in shifting the reaction of the urine from alkaline to acid by giving sodium bicarbonate, on one hand, and phosphate and methenamine, on the other. The fever subsided, but some pyuria persisted.

BENJAMIN, Montreal, Canada.

GYNECOMASTIA. C. I. PARHON, ST.-M. MILCOU and M. SCHACHTER, Rev. franç. d'endocrinol. **13**:352 (Oct.) 1935.

Parhon and his co-workers report a case of gynecomastia in a man aged 21. The condition began at the age of 14, a year after an attack of scarlet fever. At the time of the communication the patient was 178 cm. tall and weighed 65 Kg. Both breasts were enlarged, and the nipples were slightly umbilicated and surrounded by pigmented areolas about 4 cm. in diameter. The external genital organs were well developed. The pigmentation of the sexual organs and the distribution of pubic hair were of the masculine type; there was a good crop of hair on the head, but the hair on the face was patchy. Both the upper and the lower extremities were well covered with hair, the chest was hairless, and in the sacral region there was a triangular zone of hypertrichosis, in contrast to a lack of hair on the rest of the back. The sella turcica was of normal size and appearance. The patient is said to have had a normal sexual development, with heterosexual experiences since the age of 18½. Both breasts were amputated. Anatomic study revealed mammary glands in the form of flattened disks, 8 cm. in diameter and 2 cm. thick, weighing 170 Gm. They consisted of grayish white fibrillary tissue with islets of fat and small dark zones of glandular tissue and vessels. Histologic

examination revealed an abundance of collagenous tissue, a paucity of fat tissue and signs of activity of the glandular epithelium. The picture suggested the mammary glands of an adolescent female in a relatively quiescent state. The authors review the literature and repeat the opinion of Levy, who considers gynecomastia as a manifestation of heterosexual potentiality in males. This point of view is based on the occurrence of gynecomastia combined with pseudohermaphroditism or real hermaphroditism and genital malformations, as observed by Urechia. They also call attention to the opinion of Maranon, who thinks that gynecomastia is a sign of "intersexuality," that the mammary gland has a congenital predisposition to hypertrophy, and that this may occur under various hormonal or mechanical influences. All authors suggest surgical cosmetic repair.

NOTKIN, Poughkeepsie, N. Y. [ARCH. NEUROL. & PSYCHIAT.]

THE KETOGENIC REGIMEN IN THE TREATMENT OF URINARY INFECTIONS IN THE CHILD. J. CHATAIN, Progrès méd., Feb. 15, 1936, p. 269.

Chatain discusses and reports on the use of the ketogenic diet in urinary infections. Among twenty-four children with urinary infections, fifteen showed rapid and definite cure; six showed relapses, and in three cases it was impossible to obtain the proper concentration of β-oxybutyric acid or the proper p_H.

LESLIE, Evanston, Ill.

GONOCOCCIC VULVOVAGINITIS IN CHILDREN. EUGÉNIE BACK-SLUTZKY, Rev. franç. de pédiat. **11**:736, 1935.

Back-Slutzky has made an extensive study of vaginitis in children. Among 5,000 girls she found vaginitis in 8 per cent between the ages of 1 and 10 and in 4 per cent between the ages of 10 and 15. In 49 per cent of these the condition was due to the gonococcus. As far as she could determine, the infection had an extragenital origin in 97.7 per cent of the cases and was due principally to unhygienic conditions, indiscriminate use of contaminated materials, such as towels and bed linen, or crowded conditions which necessitated the child sleeping with some member of the family who was infected.

She recommends that every girl in an institution should be examined by the doctor at least once a month, that individual linen and toilet facilities should be provided and that more complete instructions in personal hygiene should be given to the public.

LESLIE, Evanston, Ill.

TONSILLITIS AND RENAL INFECTIONS IN CHILDREN. P. A. SAINZ and J. PARDO JIMÉNEZ, Arch. de med. inf. **5**:162 (June) 1936.

The authors found that 45 per cent of infections of the kidneys follow tonsillitis. Systematic analysis of the urine is of great importance. The functional capacity of the kidney is rarely affected. The mechanism of the infection has not been ascertained but must lie in bacterial embolism, toxemia or tonsillar and renal endocrine changes.

SANFORD, Chicago.

FEMALE HYPOSPADIAS. C. GAMA, Pediat. e puericultura **4**:485 (June) 1935.

The possible embryologic development is discussed. The treatment is by plastic operation or dilatation by sounds, with later puncture. The latter was the procedure in this instance.

SANFORD, Chicago.

TOPOGRAPHIC RELATIONS OF THE PROSTATE IN HERMAPHRODITISM. L. MOSZKOWICZ, Virchows Arch. f. path. Anat. **295**:211, 1935.

In a previous communication Moszkowicz described the relation of the prostate to the vagina and urethra in hermaphroditism and presented the results of a study of the embryologic development of the prostate. The latter begins its development

before any sexual differentiation has occurred. In the male it continues to grow; in the female it disappears. In pseudohermaphroditism with female gonads the prostate lies cephalad to the union of the vagina with the urethra. In pseudohermaphroditism with male gonads the vagina passes through the prostate, and the greater portion of the latter surrounds the urethra caudad to the union of the vagina with the urethra. The study reported here is based on an examination of six more specimens of hermaphroditism, two masculine and four feminine. The previous findings of the relation of the prostate are confirmed. It is of passing interest that one of the specimens had been placed in the museum by Rokitansky in 1848. Knowledge of the relations of the prostate in hermaphroditism and of the normal embryogenesis of the prostate makes it possible to determine when the change from one sex to the other occurred.

SCHULTZ, Evanston, Ill. [ARCH. PATH.]

SIMULTANEOUS GLYCOSURIA AND ACETONURIA IN NONDIABETIC CHILDREN. F. ALTMANN, Ztschr. f. Kinderh. **55**:639, 1933.

Numerous investigators have reported glycosuria in nondiabetic children. Others have reported acetonuria in nondiabetic children. Altmann studied the question whether sugar and acetone ever appear simultaneously in the urine of nondiabetic children. He gave large amounts of dextrose to children who had acetonuria as a result of a diet poor in carbohydrates and also to children who had acetonuria because of fever. The condition in which there was glycosuria in addition to acetonuria he termed "glycoketonuria."

The blood sugar curves for these children were the same as for patients with diabetes mellitus. In those in whom acetonuria resulted from a ketogenic diet glycoketonuria developed between twenty and ninety-six hours after the ketogenic diet had been instituted. No special relationship could be seen between acetonuria and blood acetone.

LEVINSON, Chicago.

HYDROCELE DURING INFANCY. G. PAPP and J. STEINERT, Ztschr. f. Kinderh. **55**:726, 1933.

Papp and Steinert believe that tuberculosis and syphilis play no such rôle in the etiology of hydrocele as has been claimed by some authors. Repeated puncture of a hydrocele increases the albumin in the fluid but reduces the chlorides.

LEVINSON, Chicago.

TRICHOMONAS AS A CAUSE OF VULVOVAGINITIS IN CHILDREN. M. RODECURT, Ztschr. f. Kinderh. **55**:729, 1933.

A case of vulvovaginitis due to Trichomonas vaginalis in a 7½ year old girl is described.

LEVINSON, Chicago.

A FIBROLIPOMA OF THE RENAL CAPSULE IN AN INFANT FOURTEEN MONTHS OLD. C. VOHNOUT and J. ZIMÁK, Časop. lék. česk. **72**:1656 (Nov. 24) 1933.

Vohnout and Zimák review the history of retroperitoneal tumors, which dates from the seventeenth century. Prives reviewed reports of eighty-seven cases of fat tumor of the renal capsule, which he culled from the literature on renal tumors. In the case which is reported in the present paper a multilocular fibrolipoma weighing 2,350 Gm. was found in an infant of 14 months with no symptoms except gradual increase in the size of the abdomen. The etiology of such growths is indefinite, and the theories include heredity, inborn predisposition and embryologic rests. The diagnosis is usually based on the abdominal enlargement. The function of the kidney is rarely interfered with, and the usual symptom is a sense of fulness. The differential diagnosis takes into account ovarian, omental, pancreatic and splenic cysts or tumors. The prognosis depends on complete eradication at operation.

Photographs and pyelograms are furnished with the article.

STULIK, Chicago.

PNEUMOCOCCIC INFECTION OF A TESTICLE IN A CHILD. JAN KOSSAKOWSKI, Pedjatrja polska **15**:218 (April) 1935.

Pneumococcic infection of the testis in a child is rare, although it may occur as a complication of pneumonia and pneumococcic infections of the ear. In this case, which concerned a boy 2 years old, the condition was primary, with acute onset, swelling of the testicle and high fever. The most important problem is the differential diagnosis, which often is quite difficult. The diagnostic point is the severity of the symptoms. The condition is usually unilateral, and, of course, the laboratory test confirms the diagnosis. KRUPINSKI, Chicago.

POTATO DIET AS A DIURETIC AGENT. G. N. ITKES and P. I. STEPUS, Vrach. delo **18**:373, 1935.

The authors point out the marked diuretic action of a potato diet. This method of treatment was tried out by the authors on 300 patients with nephritis (231 with acute, 10 with subacute and 59 with chronic disease) and 45 patients with cardiac disease.

The method employed is as follows: Each patient (an adult) receives 1 Kg. of potatoes per day (weighed in the raw state), cooked with peelings and without salt. The entire daily amount is divided in three portions and given in the form of a purée without salt. In the course of twenty-four hours the patient is given only one glass of liquid, usually in the form of milk. The patient receives this treatment for a period of from three to four days with an interval of from two to three days between treatments. The fluid intake and output are taken and recorded.

Diuresis, usually most marked at from two to three days after the administration of the potato diet, occurred in all of the patients. A rapid fall in the urea content of the saliva was likewise observed.

The mode of action of potato as a diuretic agent is not known. This action is thought to be due to its high content of potassium salts. The reduction of food and fluid to which the patient is subjected probably acts as a contributory mechanism or factor in the production of the diuresis. BODER, Los Angeles.

Diseases of the Ductless Glands; Endocrinology

FURTHER OBSERVATIONS ON TUMOR OF THE PINEAL BODY. GILBERT HORRAX, Arch. Neurol. & Psychiat. **35**:215 (Feb.) 1936.

Horrax reports two cases of tumor of the pineal body. One was that of a woman 42 years old. Partial removal of the tumor was followed by roentgen therapy. She was clinically well eighteen months after the operation.

The other case was that of a 10 year old boy. He presented a typical picture of macrogenitosomia praecox. Choked disk and headaches developed, and one pupil was less active than the other. The disturbance of upward conjugate movements of the eye and marked loss of pupillary reaction to light usually found associated with these symptoms were absent. He had a period of normal activity. The case was reported eighteen months after operation. Decompression was performed, followed by roentgen therapy. It is of particular interest that after therapy he had a more normal youthful appearance. BEVERLY, Chicago.

THE RAPID RESPONSE OF THYROID THERAPY IN A NEGLECTED CASE OF JUVENILE THYROPITUITARY DISEASE. ABNER I. WEISMAN and PAUL REIFER, Arch. Pediat. **53**:338 (May) 1936.

Weisman and Reifer report a case of hypothyroidism in a boy 13 years old. Until he came under their observation he had had only sporadic treatment. When regular treatment was started he was 42 inches (108.7 cm.) in height and weighed

55 pounds (24.9 Kg.). Four grains (0.26 Gm.) of thyroid substance was administered daily. At the end of ten months he had gained 6 inches (15.2 cm.) in height and only 6 pounds (2.7 Kg.). The increase in height was four times what should be expected in that period.

ORR, Buffalo.

CHOLESTEROL METABOLISM IN CHILDREN WITH AND WITHOUT ENDOCRINE DYSFUNCTIONS. M. MOLITCH and S. POLIAKOFF, Arch. Pediat. **53**:613 (Sept.) 1936.

Serum cholesterol determinations were made on 505 boys between the ages of 8 and 18 years; 157 had endocrine dysfunctions; the remaining 284 were normal and were used as controls.

Cholesterol Distribution in Endocrine Dysfunctions

Diagnosis	Cases	Distribution of Cases with Respect to Range of Cholesterol, Mg. per 100 Cc.						
		81-100	101-120	121-140	141-160	161-180	181-200	254
Hypopituitarism	29	3	8	8	7	3	..	..
Hyperpituitarism	23	1	6	10	5	..	1	..
Hypogonadism	12	1	4	4	1	1	..	1
Hypergonadism	6	2	2	..	..	2	..	..
Delayed sex differentiation	47	1	8	11	17	8	2	..
Cryptorchidism	15	1	4	4	4	2	..	..
Hypothyroidism	23	..	5	7	8	3	..	..
Adiposogenitalism	2	1	..	..	1	..	..	..
Total	157	10	37	44	43	19	3	1

In the control group 85 per cent of the determinations ranged between 100 and 160 mg. per hundred cubic centimeters. The fat content of the diet influenced the total cholesterol content of the serum.

The values for children with endocrine dysfunctions tended to fall within the normal range. Those for the group with hypothyroidism tended to be high normal.

There was no correlation between total serum cholesterol, basal metabolism and mental level.

ORR, Buffalo.

OPERATIVE EXPERIENCE IN CASES OF PINEAL TUMOR. W. E. DANDY, Arch. Surg. **33**:19 (July) 1936.

Three patients, two of them children with tumor of the pineal body, had total extirpation of this body and survived the operation. One of the patients died three months later. In the second patient the tumor recurred in two and one-half years. The third patient was living and apparently well four months after the operation. The diagnosis of a pineal tumor by neurologic signs and symptoms is possible only occasionally. The most significant disturbance, according to Dandy, is limitation of the upward gaze, the objective evidence of which is ptosis, usually bilateral. The differentiation of pineal tumor from tumor of the cerebellum is always difficult. In children the most noteworthy localizing sign is an area of calcification in the pineal region. A precise diagnosis of pineal tumor is probably always possible by ventriculography. The technic of the diagnosis and of the operative procedure is described.

KAISER, Rochester, N. Y.

GONADOTROPIC SUBSTANCE IN URINE OF NORMAL CHILDREN. S. C. FREED, Proc. Soc. Exper. Biol. & Med. **33**:35 (Oct.) 1935.

The urine of normal boys and girls was extracted by the Katzman and Daisy benzoic acid method. This material when injected had no effect on the ovary of the immature rat. The pituitary extract was made with ammoniated alcohol, and

in the dosage used caused only a slight increase in the weight of the ovaries of test animals. When the two extracts were combined, a definite synergism was observed. This varied with the age of the child, there being little or no effect in children from 4 to 5 years old. Above this age the gonadotropic response gradually increased, until at 10 years of age values equaling those for normal adults were obtained. Histologic examination of the ovaries of the test animals revealed a heavy luteinization. The presence of appreciable amounts of gonadotropic substance in the urine of prepubertal children has been demonstrated. This hormone resembles the gonadotropic principle in the urine of pregnant women in its action and not the follicle-stimulating material formed in the urine of castrated subjects or of women at the menopause. The presence of this substance in the urine of normal children suggests the pituitary gland as its source.

HANSEN, Minneapolis.

INFLUENCE OF ACID EXTRACT OF CATTLE ANTERIOR PITUITARY GLAND ON BONE REPAIR IN YOUNG GUINEA PIGS. M. SILBERBERG and R. SILBERBERG, Proc. Soc. Exper. Biol. & Med. **33**:177 (Oct.) 1935.

It has been previously shown (Silberberg, M.: *Proc. Soc. Exper. Biol. & Med.* **32**:1423, 1935) that a growth-promoting effect is exerted by the acid extract of the anterior lobe of the pituitary gland of cattle on bone and cartilage in young guinea-pigs.

The authors concluded that the acid extract of the anterior lobe of the pituitary gland of cattle has a growth-promoting effect in callus formation of fractured bone in young guinea-pigs. The tendency to healing of fractures is accelerated. This is due to a faster transportation of mesenchymal granulation tissue which is converted (1) directly into osteoblasts, osteoid tissue and bony substance or (2) indirectly into cartilage and afterward into bone by way of endochondral ossification. More active absorption of the newly formed tissue takes place. There is noted a parallelism between the formation of cartilage and the rapidity of endochondral ossification in the epiphysial line on the other hand.

HANSEN, Minneapolis.

PINEAL TERATOMA. A. J. MCLEAN, Surg., Gynec. & Obst. **61**:523, 1935.

McLean reviews the 25 recorded cases of pineal teratoma and reports a new case. The tumor was parapineal, measured 21 by 18 by 25 mm., and showed a remarkable array of tissues, including cysts lined with stratified epithelium, surrounded by sweat and sebaceous glands, also cysts lined by ciliated epithelium. Connective tissue, fat, striated muscle and ganglion cells were likewise present. The teratoma had a more complicated structure than any previously reported.

HUNTER, Portland, Ore. [ARCH. PATH.]

THYROID DISEASES OF CHILDREN. K. H. DOEGE, Wisconsin M. J. **34**:627 (Sept.) 1935.

Simple goiter or colloid goiter with or without adenoma usually seen at or before puberty is the most frequent disease of the thyroid in children. When the lateral lobes held between the thumb and the forefinger are 6 cm. or more in diameter, the basal metabolic rate usually ranges from 8 to 18 per cent below the average. Bruit and thrills are usually present; also pulsation of the superior thyroid artery may be felt. The usual facies, coloration, dry skin and lack of energy are noted when the condition is more pronounced. If from 5 to 10 mg. of thyroxin is given intravenously, the bruit, thrills and palpability of the arteries will disappear in from twenty-four to thirty-six hours. The administration of iodine will prevent the development of colloid goiter and favors absorption of an excess of colloid.

Pregnant mothers should be given iodine to prevent the occurrence of cretinism. Iodine should be given to children not later than the sixth year to prevent the formation of adenomatous goiter, which seems always to have its inception in

diffuse colloid goiters. All sources of infection should be eradicated since they seem to deprive the thyroid gland of available iodine.

The differential diagnosis from the rarer exophthalmic goiter is given which approximates that in the adult. A child with a systolic blood pressure under 120 or a pulse rate under 120 is not likely to have exophthalmic goiter.

The value for basal metabolism may be improved by determination of the cholesterol content of the blood, which is greatly lowered in exophthalmic goiter and increased in myxedema and cretinism. The present vogue of giving iodine to pregnant women and to children is favored. JANNEY, Wauwatosa, Wis.

SENSIBILITY TO INSULIN IN DIABETIC CHILDREN. P. NOBÉCOURT, PAUL DUCAS and M. LAROCHE, Arch. de méd. d. enf. **39**:633 (Oct.) 1936.

In considering the frequency of hypoglycemic accidents in the course of ambulatory treatment, these distinguished French clinicians report that thirteen patients have been under observation since 1927. Of these, eleven have been enabled to carry on the normal life of childhood, while two have died through the imprudence of their parents. Insistence on weekly or bimonthly examinations seems essential in avoiding accidents and in meeting complications in their incipiency. In some instances, hypoglycemia appears in spite of small and carefully fractioned doses of insulin, manifesting itself in divers ways; there may be, for example, malaise, appearing two or three hours after the injection, with a fleeting sensation of hunger and emotional outbursts. Vasomotor disturbances, with pallor of the face, may be noted; in other cases, an unaccustomed apathy may be found.

Occasionally these effects may be more serious, and the child suffers from syncope or sustains convulsive crises of varying length. Notwithstanding the intensity of these seizures, however, the evolution of the disorder is favorable, and the manifestations disappear promptly on the ingestion or the subcutaneous injection of a solution of sugar.

Numerous cases are cited to illustrate the varied character of these attacks and the methods best suited to anticipate them among susceptible children.

AMESSE, Denver.

PRECOCIOUS PUBERTY DUE TO HYPERFUNCTION OF THE ADRENAL GLANDS AS A STATE OF DEGENERATION. IGNACY PINES, Rev. franç. d'endocrinol. **13**:286 (Aug.) 1935.

Pines reports a clinical case in which there were signs of a disturbance of the endocrine system and stigmas of degeneration in support of Jules Bauer's concept that dysfunction of the endocrine system is an expression of a general state of degeneration which is constitutionally determined. The case is that of a man, aged 23, with pronounced hirsutism, acromegalic features and a large sella turcica. He was seen originally, at the age of 14, by Bauer. At that time there were signs of precocious puberty with retarded growth and premature union of the epiphysis. Bauer considered the condition at precocious puberty due to dysfunction of the adrenal glands. It is of importance that the hirsutism appeared at the age of 9 and that retardation of growth was noted even earlier. At the age of 15 the hair became gray. Progress in school was poor. At the age of 23, when the patient was seen by Pines, the weight was 57 Kg. and the height 145 cm. The neck, the torso and all the extremities were covered with thick black hair, the forehead was high and prominent, the orbits had a mongoloid slant and the face was of the acromegaloid type, with a large nose, which was flat at the base. All the teeth were missing; the tongue was remarkably long and large. The stigmas of degeneration consisted of an open umbilical ring, numerous fibromatous nodules in the skin of the abdomen and a large keloid near the umbilicus. The upper and lower extremities were very short, the hands were large and ungainly and the fingers and toes were large, short and heavy. The phallus was enlarged, but the other external genital organs were of normal size. The blood pressure was within normal limits. Roentgenographic examina-

tion of the long bones revealed changes resembling those seen in cases of chondrodystrophy. The sella turcica was very much enlarged. Pines believes that the original genito-adrenal syndrome has, so to speak, changed into one of acromegaly since its original appearance at the age of 9. He explains the retardation of growth by the early closing of the epiphyses and the possible chondrodystrophy. He raises the question whether signs of dysfunction of the adrenal and pituitary glands have developed independently of each other and in this connection discusses Cushing's syndrome, which, though caused by a basophilic adenoma of the pituitary gland, has all the characteristics seen in cases of corticorenal involvement. He mentions the cases described by Falta, Mathias and Jules Bauer in which signs of acromegaly were first seen and later signs of dysfunction of the adrenal glands developed. Pines believes that in his case precocious puberty with hyperfunction of the adrenal glands preceded the syndrome of dysfunction of the pituitary gland. On the whole, he thinks that the patient presents an agglomeration of abnormal constitutional signs or a "state of degeneration." He emphasizes especially the significance of the stigmas in this combination. He believes that the signs of dysfunction of the endocrine system as well as the stigmas are concomitant phenomena of a degenerative state.

NOTKIN, Poughkeepsie, N. Y. [ARCH. NEUROL. & PSYCHIAT.]

HYPOTHYROIDISM OF SYPHILITIC ORIGIN. MANUAL BLANCO OTERO, Arch. españ. de pediat. **20**:87 (Feb.) 1936.

Blanco Otero reports the occurrence of this comparatively rare pathologic anomaly in a child 4 years old. The hereditary syphilitic manifestations consisted mainly of periostitis, manifested particularly in the upper extremities. The cretinic manifestations were marked, particularly the facial and somatic characteristics and retarded development of the carpal bones. The stature of the child corresponded to that of a child of 19 months, but the mass development corresponded to that of a child of 4 years. The author is of the opinion that the syphilitic infection was the responsible etiologic factor in the development of the endocrine dysfunction.

SCHLUTZ, Chicago.

HEREDITARY DYSFUNCTION OF THE THYROID GLAND IN INFANCY. M. A. JAUREGUY, Arch. de pediat. d. Uruguay **6**:533 (Dec.) 1935.

Three cases are presented in which there was a low metabolic rate in children whose mothers suffered from exophthalmic goiter. These children appeared to be in good health but differed a little from the average normal child of the same age. One child had definite cretinism, which was transformed into very slight hypothyroidism by continued treatment. The other two children were practically normal, but their basal metabolic rates were definitely subnormal (—3 in both). Jaureguy ends by saying that in Uruguay there are no goitrogenic regions and that the majority of cases of thyroid disorder there are seen in foreigners or their offspring.

SCHLUTZ, Chicago.

HYPERINSULINISM. GEORG OSKAR HARNAPP, Monatschr. f. Kinderh. **65**:407 (May) 1936.

An interesting case report is given of a child 7 years of age who was brought to the hospital with convulsions of an epileptic nature. There seemed to be some psychic disturbance also. Physical examination, however, revealed little of importance. The spinal fluid was normal. Suspicion that the disease was not typical epilepsy was aroused when more careful inquiry revealed that the convulsions occurred mainly before breakfast. Determinations of the blood sugar showed a value as low as 27 mg. per hundred cubic centimeters.

The condition was diagnosed as hyperinsulinism. Large doses of carbohydrate caused some improvement in the symptoms. Galactose seemed the least effective

of the sugars tried. As might be expected, injections of insulin made the condition worse.

The writer then reasoned that any treatment which would be contraindicated in diabetes might be of value and so ordered a high protein diet. There was some response to this, but the condition persisted; so it was felt that surgical intervention was indicated.

On operation, an adenoma was removed from the pancreas. Pathologic examination showed that it consisted of tissue from the islands of Langerhans.

After the operation the patient made a spontaneous recovery.

GERSTLEY, Chicago.

THE LACTATION HORMONE OF THE ANTERIOR LOBE OF THE HYPOPHYSIS. K. EHRHARDT, München. med. Wchnschr. **83**:1163 (July 17) 1936.

In 1928 Ehrhardt reported a case in which he transplanted the anterior lobe of the hypophysis of an animal. The patient, who had previously had amenorrhea, began to have regular menstrual cycles shortly after the operation. In addition it was noticed that a few days after the operation the breasts were swollen and tender. They contained colostrum, although the woman was not pregnant. These observations received little attention until 1932, when Riddle devised a test for the presence of the lactation hormone of the anterior lobe of the hypophysis.

Ehrhardt tried the effect of the hormone in nursing mothers whose milk supply was low. He administered from 50 to 100 units of the hormone subcutaneously, orally or percutaneously. In some he succeeded in increasing the amount of milk produced, and in others the treatment failed. He explains his failures as due to the lack of development of the mammary glands in the women involved. The proper development of the glands is brought about by the follicular hormone and the corpus luteum hormone. If this has not occurred, the stimulating effect of the lactation hormone fails.

BRAHDY, Mount Vernon, N. Y.

EFFECT OF ROENTGEN RAYS ON THE THYROID GLAND OF THE GROWING ORGANISM. A. VIETHEN, Ztschr. f. Kinderh. **56**:400 (July 25) 1934.

Histologic studies on the thyroid glands of growing rats revealed that glands in a relatively inactive state are not influenced by roentgen rays but that glands in a state of hyperactivity (induced by lack of vitamin D) show inhibition of their activity in practically all instances. The effect of diminishing activity in hyperactive thyroid glands was regularly absent in adult rats. Viethen cautions against irradiating the cervical region in infants and young children.

SIEMSEN, Chicago.

THE PITUITARY GLAND AND LACTATION. Z. PŘIKRYL, Časop. lék. česk. **74**:571 (May 24) 1935.

Přikryl gives a short review of the history of the origin of lactation and cites the neurogenic, mechanical and humoral theories. Breast feeding keeps up the supply of milk but does not originate it. The onset of the secretion of milk in the nonpregnant Siamese twin is cited as an argument for endocrine secretion as a factor. An acromegalic male of 32 years was observed with spontaneous lactation after he had shown a pituitary symptom complex for three years. Other observations pointing to the relation of the activity of the anterior lobe of the pituitary gland to lactation are cited.

STULIK, Chicago.

LOCAL LYPODYSTROPHY AFTER INJECTIONS OF INSULIN. M. KINCZLER, Orvosi hetil. **80**:714 (July 26) 1936.

On each arm of a 9 year old boy who had been receiving injections of insulin over a period of two years for diabetes there developed a painless tumor the size of a child's fist, without any signs of inflammation. The histologic examina-

tion showed an increase of connective tissue with signs of chronic inflammation in the place of the fat tissue. The child had always received the insulin on the two spots where the tumors developed. When injections of insulin are given always in the same place the result is mostly that the fat tissue disappears and a cavity develops. The alterations described are much rarer. It may be that the changes are caused not by insulin but by mechanical irritation, which brings about chronic inflammation with increase of the connective tissue. These changes are easily avoided by not giving the injections always in the same place.

GÖTTCHE, Budapest, Hungary.

Diseases of the Muscles, Bones, Joints and Lymph Glands

CONGENITAL BILATERAL PARIETAL FORAMINA. REGINALD C. JEWESBURY, Proc. Roy. Soc. Med. **29**:737 (May) 1936.

A patient 7 years of age was presented. He had been under observation since infancy and had received an antirachitic diet. The skull had been asymmetrical since birth. The anterior fontanel closed early in the first year, but over the posterior surface of the head a large soft area was noticed and was taken for a patent posterior fontanel. This gradually became reduced in size, and a ridge of bone developed in the center of it, dividing it into two portions situated over the parietal bones. These areas remained membranous until the fifth year. At the time of this report they could be distinctly felt as two rounded depressions about the size of a shilling (25 cent piece). Both parents and their three other children have normal heads. A roentgenogram of the skull accompanies the report.

WILLIAMSON, New Orleans.

TWO CASES AND SPECIMENS FROM A THIRD CASE OF PUNCTATE EPIPHYSEAL DYSPLASIA. DONALD BATEMAN, Proc. Roy. Soc. Med. **29**:745 (May) 1936.

The first patient was a girl of 7 months, whose mother and the maternal grandfather both had short arms. The patient had very short legs and arms. The eyes showed bilateral congenital cataract. The skin of the palms was deeply furrowed and adherent to the deep tissues. The child appeared to be mentally deficient. Roentgenograms of the epiphyses of the long bones showed them to be stippled and expanded and the diaphyses of the humeri and femurs to be shortened. The vertebral bodies also showed some deformity in shape and stippled ossification.

A boy of 7 months with a similar condition was presented at the same meeting. Pathologic specimens from a patient of Dr. Lightwood were shown, the child having been presented at the meeting of the section for the study of disease in children on Oct. 28, 1930. Two months after presentation the child had died from miliary tuberculosis. The report is accompanied by roentgenograms of the long bones and the vertebrae.

WILLIAMSON, New Orleans.

OSTEOMYELITIS WITH MULTIPLE FOCI SIMULATING ACUTE RHEUMATIC FEVER. R. ETCHELAR and JOSÉ A. SOTO, Arch. de pediat. d. Uruguay **7**:200 (May) 1936.

The authors report a case of osteomyelitis of the left wrist and hip joint in which a diagnosis of acute rheumatic fever was made at the onset. This was discarded because of the failure to respond to salicylates in massive doses and because the x-ray film demonstrated the presence of osteomyelitis. The child recovered spontaneously.

SCHLUTZ, Chicago.

INTRA-UTERINE MULTIPLE SPONTANEOUS FRACTURES. P. CANTONNET and H. CANTONNET, Arch. de pediat. d. Uruguay **7**:354 (Aug.) 1936.

The Cantonnets report this condition in a premature hypothreptic infant, born spontaneously, weighing 1,700 Gm., with marked rarefaction of the

skull bones, which were partly membranous, angular deformity of the left thigh and thickening of bone in the extremities. The spleen was not enlarged, the scleras were normal in color, and the Wassermann test was negative. The roentgen rays showed fracture of the middle third of the shaft of the left femur with marked callus formation, subperiosteal fracture of the left ulna, fracture of the shaft of the right ulna without displacement of fragments, and bowing of the diaphyses of all the long bones without epiphysial alterations (except slight thickening of the inferior extremities of the femurs). The periosteum was normal. They conclude that the case was one of congenital (nonhereditary) osteopsathyrosis. Later the child died as the result of intercurrent infection (owing to prematurity). Permission for postmortem examination was not obtained.

SCHLUTZ, Chicago.

DIFFERENTIAL DIAGNOSIS OF MYOTONIA CONGENITA (OPPENHEIM) AND INFANTILE PROGRESSIVE SPINAL MUSCULAR DYSTROPHY (WERDNIG-HOFFMANN). R. STEINDLER, Arch. f. Kinderh. **106**:235, 1935.

Cases of infantile progressive spinal muscular dystrophy in two brothers showed the following characteristics differentiating the Werdnig-Hoffmann form of the disease from the Oppenheim form: an onset of the disease at the end of the first month or during the second six months, obvious progression, the reaction of degeneration, fibrillary twitchings of the patient and familial occurrence.

CRANE, Chicago.

THE ENDOCRINE SYSTEM IN OSTEOGENESIS IMPERFECTA. L. THER, Virchows Arch. f. path. Anat. **295**:57, 1935.

A number of writers have held that osteogenesis imperfecta is the result of abnormality of the endocrine system. Ther reports a case in a girl aged 6 years who at the time of death presented no abnormality of any of the endocrine organs. In a brief appendix he reports a second case in a child aged 3 months in whom also there were no detectable endocrine abnormalities.

SCHULTZ, Evanston, Ill. [ARCH. PATH.]

Diseases of the Eye

HISTOPATHOLOGY OF COLOBOMA OF THE CHOROID AND OPTIC-NERVE ENTRANCE. M. L. FOLK, Am. J. Ophth. **17**:1126 (Dec.) 1934.

Folk reports the case of a woman aged 46 who stated that she had always had poor vision in her left eye and who on arrival in this country had been told that she had a coloboma of the iris. She was having pain in this eye, and a diagnosis of glaucoma, probably secondary to chronic iridocyclitis, coloboma iridis and cataract was made. As conservative treatment failed, the eye was enucleated. The author states the following conclusions:

"1. A microscopic study of coloboma of the choroid and optic-nerve entrance, probably the first one in the United States, is reported.

"2. The choroid and pigment epithelium were entirely absent in this specimen.

"3. The retina was present throughout, but in a state of malformation.

"4. Neither inflammatory products nor mesodermal strands were found in the region of the coloboma. The presence of doubling of the retina and cyst formation are in support of the ectodermal theory of coloboma formation.

"5. The defect at the nerve entrance was found outside of the nerve sheaths, hence the name coloboma of the optic-nerve entrance."

REESE, Philadelphia. [ARCH. OPHTH.]

STRABISMUS IN CHILDREN CORRECTED BY REFRACTION ALONE. G. P. GUIBOR, Am. J. Ophth. **18**:944 (Oct.) 1935.

Guibor records the following conclusions :

"1. A report is made of 185 patients with confirmed nonparalytic squint, for whom only glasses were prescribed and who did not have the benefit of occlusion, atropinization, nor fusion training. Of these patients 63.43 per cent were unimproved, 13 per cent were improved and 23.6 per cent had no squint with glasses (nine patients or 0.4 per cent had no squint when glasses were removed).

"2. A high degree of squint and amblyopia have the greatest influence in retarding recovery from squint.

"3. Out of 26 patients, 5 with alternating squint recovered with the use of glasses; of these, three could fuse with depth effect, and two had poor fusion of flat objects.

"4. Patients in the younger groups (2 to 4 years) recover more easily and in greater numbers than do those in the older-age groups.

"5. Patients with the accomodative type of squint recover most readily by correction of the refractive errors."

REESE, Philadelphia. [ARCH. OPHTH.]

DACRYOSTENOSIS IN CHILDREN. R. O. RISER, Am. J. Ophth. **18**:1116 (Dec.) 1935.

Riser's conclusions are as follows:

"1. It was necessary to wait 3.5 months before satisfactory results were obtained in the most persistent of the congenital cases under conservative treatment, while the average time required for recovery was 1.4 months. Therefore, it would be well to wait for three or four months before probing, if the case is under control, for in two thirds of the cases of congenital dacryostenosis treated by expectancy plus antiseptic solution and pressure over the sac, we have seen the duct open without further interference.

"2. Probing, when necessary, can safely be performed satisfactorily with a number-two Bowman's probe without a canaliculotomy. The results with this simple procedure were uniformly satisfactory, and we see no reason for using larger probes in infants when conservative medical care plus conservative probing was effective in 97 per cent of our cases of congenital dacryostenosis.

"3. Only 50 per cent of our cases of acquired dacryostenosis were arrested by conservative and simple therapy. The other half have required or do require a dacryocystectomy or other major operation of the lacrimal drainage apparatus, thus showing a marked difference in comparison with the benign course of the great majority of congenital cases of dacryostenosis."

REESE, Philadelphia. [ARCH. OPHTH.]

OPHTHALMIA NEONATORUM. T. C. BASU CHOUDHARY, M. Digest **3**:424 (Feb.) 1936.

Basu Choudhary discusses the incidence of ophthalmia neonatorum in India, where there is no law regarding prophylaxis, and in other countries, in which such laws are in operation. He does not believe that the instillation of a drop of a 2 per cent solution of silver nitrate into the eyes of the new-born has given satisfactory results in the prevention of ophthalmia neonatorum. It is not a sure preventive, and the resulting secretion may interfere with the early recognition of a true gonococcic ophthalmia. He expresses the belief that the principal efforts should be directed toward recognizing gonorrheal infection in the expectant mother and treatment of her condition before the birth of the child. Superficial sterilization of the birth canal before delivery in hospital clinic cases may also be of help.

Instead of the use of a 2 per cent solution of silver nitrate the author recommends flushing of the eyes of the new-born with sterile solution of boric acid and

the instillation of a 0.5 per cent solution of silver nitrate on three successive days. Compulsory report of all cases of ophthalmia neonatorum and compulsory report of the results of treatment should be established. LESLIE, Evanston, Ill.

CONGENITAL ABSENCE OF ABDUCTION WITH ENOPHTHALMOS OCCURRING DURING ADDUCTION. I. NICOLACOPOULAS, Ann. d'ocul. **172**:796 (Sept.) 1935.

Nicolacopoulas describes a case in which there was complete congenital absence of abduction of the left eye, associated with diminished adduction. This was accompanied by enophthalmos of 2 mm., diminution in the size of the palpebral fissure and slight rotation of the eyeball downward.

BERENS, New York. [ARCH. NEUROL. & PSYCHIAT.]

DEGENERATION OF THE CORNEA OF THE NODULAR TYPE OF GROENOUW: ITS RELATION TO LATTICE KERATITIS. P. BONNET and J. BUSSY, Bull. Soc. d'opht. de Paris, November 1935, p. 715.

Two sisters had bilateral corneal degeneration of the Groenouw type indistinguishable from the grill or lattice keratitis described by Dimmer and Haab. An uncle on their mother's side was known to have the same disorder. The nodules were disseminated in great numbers in the median region of the cornea. In addition, certain changes in the periphery showed a relation to the grill keratitis. Small dots seemed suspended under an edema on the nerve fibers. These dots were very refractile. The findings in the three patients suggest to the authors a relationship between the two types of keratitis.

MAYER, Chicago. [ARCH. OPHTH.]

GLAUCOMA AND INFANTILE ENCEPHALOPATHY: RÔLE OF HEREDITARY SYPHILIS. R. A. MARQUÉZY and TAVENNEC, Bull. Soc. de pédiat. de Paris **33**:222 (March) 1935.

A boy 6½ years old had shown evidence of encephalopathy with left hemiplegia and convulsive seizures from the first year of life. Soon after the onset of this trouble bilateral glaucoma was diagnosed, which was considered to be congenital. The Wassermann reaction of the spinal fluid was positive. Antisyphilitic treatment was instituted, and after a year the ocular tension in both eyes was normal and the corneas clear. BENJAMIN, Montreal, Canada.

CONGENITAL OCULAR HYPERPIGMENTATION. G. CAVALACCI, Ann. di ottal. e clin. ocul. **42**:475 (Dec.) 1935.

Cavalacci observed congenital hyperpigmentation of the eye in three persons. Two were sisters, and the third knew of a paternal cousin similarly affected. In one patient the condition was unilateral; in the other two patients both eyes were affected. The involved eyes showed patches of pigment in the sclera from the equator forward almost to the limbus. All the subjects were brunettes; their irides were unusually dark, and their fundi were more darkly pigmented than normal. Cavalacci calls attention to the presence of a few pigmented cells in the normal sclera, especially of the brunette, and believes that the condition described is due to hypertrophy and proliferation of these cells, the same process occurring in other parts of the eye. The condition affects chiefly brunettes, and in certain families a hereditary factor seems to be present. In Cavalacci's patients the pupils were relatively refractory to mydriatics.

GIFFORD, Chicago. [ARCH. OPHTH.]

THE SYNDROME OF BLUE SCLERAS. C. CORDERO, Arch. di ottal. **42**:521 (Dec.) 1935.

This concludes an article previously reviewed in part, which constitutes a complete monograph on the subject of blue scleras. Cordero discusses certain

phenomena associated with the condition aside from the well known fragilitas ossium. Deafness, the third symptom in the syndrome described by van der Hoeve, Cordero noted in two of his cases, and in the others, abnormalities of the vestibular mechanism, usually hyperirritability. Only one showed the blue discoloration of the tympanic membrane which has been described in a few cases recorded in the literature. Syndesmolysis, or frequent dislocation of various joints, was present in all his cases. Neuromuscular changes were present in all, consisting in hyperirritability as shown by electric tests. None of the patients showed psychic abnormalities. One showed marked diminution in the elastic tissue of the skin. Two showed anomalies of the teeth, one having lost all the teeth at an early age, and all gave a history of late eruption of the teeth. Fragility of the nails and loss of hair were observed in most of the patients. The blood calcium was normal, as were other factors of the blood chemistry except that cholesterol was increased in all but one of the patients, reaching 400 mg. in two. The dominant hereditary character of the syndrome was evident in Cordero's family, seventeen of thirty-eight members being affected. After a review of various theories, he gives his reasons for believing that hypoplasia of both mesenchymal and ectodermal tissues must be present to account for all the changes observed in the syndrome.

GIFFORD, Chicago. [ARCH. OPHTH.]

BILATERAL FAMILIAL MICROPHTHALMOS ASSOCIATED WITH CONGENITAL MACULAR DEGENERATION. G. BORSELLINO, Rassegna ital. d'ottal. **4**:181 (March-April) 1935.

Bilateral amaurotic microphthalmos in three brothers is described. In two of the patients there were lesions of the macula and optic nerve; in the third the fundi could not be explored.

The macular changes resembled macular lesions of the familial degenerative type. These may be associated with microphthalmos.

The etiology of conditions of this type and their pathogenesis, outside of arrested development or dystrophy, have been open to many conjectures. The true factors remain unknown.

SYRACUSE, New York. [ARCH. OPHTH.]

FAMILIAL CONGENITAL ANOPHTHALMOS. A. TISCORNIA and B. J. TISCORNIA, Arch. de oftal. de Buenos Aires **10**:355 (June) 1935.

After commenting on the embryology of the eye and on the genesis of anophthalmos and microphthalmos, the Tiscornias report bilateral congenital anophthalmos in four members of a single family and in a fifth person not related to the familial group. In two of the first group and in the fifth person no trace of an eyeball could be made out by palpation; in the other two of the first group a round hard small body which might be a rudimentary eyeball could be felt on one side. None showed any other developmental abnormalities or stigmas. The first group belonged to a family of nine—four males and five females, two of each sex being affected. No data on the heredity or other data are available. In the isolated case there was consanguinity between the parents.

FINLAY, Havana, Cuba. [ARCH. OPHTH.]

FAMILIAL MICROCORNEA. G. VON GROLMAN, Arch. de oftal. de Buenos Aires **10**:741 (Sept.-Oct.) 1935.

Von Grolman observed pronounced pure microcornea in a brother and sister of 42 and 35 years. In childhood they had good sight, complicated in the brother by cataract and in the sister by high myopia (over 20 diopters), the eyes being otherwise normal.

He reports his examination of the patients in detail and reviews the statistics on malformations of this and allied types, eliminating the possibilities of confusion with microphthalmos, cornea plana and pseudomicrocornea.

FINLAY, Havana, Cuba. [ARCH. OPHTH.]

RETINOCYTOMAS. E. M. ALENCAR and O. P. CAMPOS, Arch. de pediat., Rio de Janeiro **7**:552 (Sept.) 1936.

These malignant retinal gliomas are seen in children from 4 to 15 years of age. The diagnosis is based on the characteristics of any ocular glioma that invades the retrobulbar space. Photomicrographs are shown. Immediate operation offers the only hope.

SANFORD, Chicago.

ABLATIO FALCIFORMIS CONGENITA. H. WEVE, Arch. f. Augenh. **109**:371, 1935.

Weve reports seven cases of a congenital defect of the retina which he terms "ablatio falciformis congenita." The anomaly varies in appearance from that of a sector-shaped detachment of the retina to that of a pseudoglioma. In the majority of the cases the retina shows a duplication stretched out like a sail between the papilla and the region between the lens and the ciliary body. In the cases reported the fold was in the lower temporal quadrant.

In one of the cases in which the eye was examined histologically the fold was caused by a skein of connective tissue in the anterior portion of the vitreous. This skein was more or less connected with the lens and with the surface of the retina, which was proliferated at this point.

No inflammatory signs were present which differentiated this condition from that caused by cyclitic membranes, nor were there any evidences that trauma had played a part. The finding of a persistent pupillary membrane in the same sector, as well as the familial occurrence and the predilection for a certain section of the retina, places this in the category of a congenital defect due to some unknown disturbance in development.

In the connective tissue a considerable amount of hematogenous pigment was found, which suggests the possibility that hemorrhages in the membrana vasculosa lentis or in the primary vitreous may have played a rôle.

In all the cases in which the condition was bilateral, vision was exceedingly poor and nystagmus was present.

The article is excellently illustrated with drawings of the fundi.

ADLER, Philadelphia. [ARCH. OPHTH.]

HEREDITARY CONGENITAL ATROPHY OF THE OPTIC NERVE: REPORT OF A GENEALOGY. F. RIEDL, Klin. Monatsbl. f. Augenh. **95**:332 (Sept.) 1935.

Riedl reports on hereditary atrophy of the optic nerve after Leber. The genealogy of a family in which this disease was observed in three generations is given in detail and the literature quoted. A short synopsis of sixteen genealogies reported by divers authors is added. Atrophy of the optic nerve had been present apparently since birth. The clinical picture was typical except for the irregularity of some defects of the field of vision. Roentgenograms of the area of the sella turcica did not reveal any changes in the hypophysis. No general symptoms were present. The intermarriages in this family were not considered in concluding that hereditary congenital atrophy of the optic nerve is inherited according to the dominant type.

STOLL, Cincinnati. [ARCH. OPHTH.]

AN UNUSUAL FAMILIAL SUPERFICIAL CHANGE IN THE CORNEA: REPORT OF A CASE. J. K. PAMEIJER, Klin. Monatsbl. f. Augenh. **95**:516 (Oct..) 1935.

A boy aged 8 had a high degree of hypermetropia. The vision in his right eye, 2/60 of the normal, could not be improved with glasses, whereas the vision of 3/4 in the left eye was brought up to 5/4 by a convex lens of 8 diopters. The eyes were free from irritation, and the sensitiveness of the corneas was normal. The corneal microscope revealed that the superficial layers of the corneas were strewn with minute and fine gray spots and dots. Some of them were round; others had the shape of a pointed angle. The peripheral region of the cornea,

near the limbus, showed only a few isolated dots. A narrow strip in the nasal and lower quadrants of each cornea was entirely clear in the boy and in four other members of the family. The form and size of these strips varied in the five patients. The dots appeared to be minute vacuoles or blisters with a double outline and either a clear center or a clear periphery. The substantia propria and the endothelium were normal.

The mother presented similar but larger vacuoles, some of which stained green with fluorescein ; she complained of epiphora and photophobia for many years. The mother, her sister and two of the latter's four children had the peculiar clear strips. No connection existed between the clearly visible corneal nerves and the opacities. Two brothers of the mother were allegedly afflicted with the same malformation ; they could not be reached for an examination. Green staining was obtained only in the two women, not in the children. Epithelial dystrophy (Fuch's) and nodular and lattice-shaped degeneration did not exist, nor were symptoms of avitaminosis present. STOLL, Cincinnati. [ARCH. OPHTH.]

FEBRIS UVEOPAROTIDEA (HEERFORDT). A. D. NOWKIRISCHKY, Klin. Monatsbl. f. Augenh. **95**:620 (Nov.) 1935.

Heerfordt in 1909 described a syndrome of inflammation of the uvea and parotid gland. The course was subchronic, with persistent low fever, swelling of the parotid gland, stubborn uveitis and frequent paresis of cerebrospinal nerves.

Nowkirischky reports a similar condition in a boy aged 17 in whose family tuberculosis was absent. Both eyes became inflamed consecutively, showing stippled keratitis and iritis with posterior synechiae. Nodules resembling proliferating tuberculous nodules developed in the stroma of the iris near the pupillary margin; there were also round exudative nodules in the same location. The vitreous was cloudy. The parotid glands were swollen and the lacrimal glands enlarged. The roentgenogram showed dense shadows at the hilus and veiling of the lungs, suggesting tuberculosis, the presence of which, however, remained uncertain. The condition of the eyes persisted during the hospitalization of the patient from April 16 to May 28, 1934.

Repeated treatments at the hospital and observation for seventeen months failed to establish distinctly whether there was pulmonary tuberculosis, although a tuberculous diathesis was evident and miliary tuberculosis was suspected when the roentgenogram of the lower lobe of the right lung showed small dotted shadows for a certain period. This patient's presenting a number of symptoms suggesting the tuberculous etiology of Heerfordt's disease showed that the disease may be associated with persistent grave ocular symptoms.

STOLL, Cincinnati. [ARCH. OPHTH.]

TRAUMATIC OCULAR HERPES ZOSTER. E. AMMANN, Klin. Monatsbl. f. Augenh. **95**:793 (Dec.) 1935.

Ammann discusses the literature on traumatic herpes zoster of the cornea. He refers to the controversy between Grüter and Schönfeld. Grüter succeeded in producing an eruption of typical herpes zoster by injecting brain substance from animals which were infected with herpes. Schönfeld and other writers, while denying the identity of the original viruses in these experiments of inoculation, admit that these viruses are related. To illustrate the relation between several types of herpes Ammann refers to an observation of his own. A girl of 8 years with typical scars of dendriform keratitis presented herpes simplex of recent occurrence. Eleven years later she presented herpes zoster on both eyelids, the corneas and the forehead, i. e., in the area of the first and second branches of the trigeminus nerve of the same side. Was the age, Ammann asks, instrumental in causing the virus to act in a dermatropic manner at first and neurotropically later?

Sufficient proof has been furnished recently, in Ammann's opinion, for the close relation between herpes zoster and forms of varicella. The virus of herpes simplex is identical, in his mind, with that of herpes zoster. It is known that herpes zoster may develop as a consequence of direct or indirect damage of larger nerves, of the

spinal cord or of the spinal ganglions and posterior roots. He quotes briefly the published reports of seven cases and reports an eighth case in support of his view that even slight lesions of the head may be followed by herpes zoster. Some questions will have to be settled: Is the virus a living or an enzymic substance? Is its origin exogenous, and does it wander from the wound along the nerves to the gasserian ganglion, or is it endogenous and attracted by the nerves and ganglions through increased neurotic irritation?

The observations prompt Ammann to the opinion that both ophthalmic herpes zoster and simple corneal herpes may be caused by injuries.

STOLL, Cincinnati. [ARCH. OPHTH.]

ON THE ORIGIN OF PHLYCTENULAR CONJUNCTIVITIS IN SCHOOL CHILDREN. N. T. ARTEMEFF, Azov-Black Sea Regional Pub. Co., symposium 3, article 5, 1935.

Artemeff studied 334 cases. He concluded that adenoids and ocular errors of refraction played no part in the origin of the disease but that the condition was usually on a tuberculous basis. SEMENENKO-MCKHANN, Boston.

OCULAR INJURIES IN CHILDREN. M. G. RABINOVICH and M. K. KULIEVA, Sovet. vestnik oftal. **7**:188, 1935.

This is a study of 194 ocular injuries in 152 boys and 42 girls up to 14 years of age treated in the Baku Central Eye Hospital during the years from 1932 to 1935. Four tables show the incidence of such traumas in children and in adults, the periods of hospitalization, the objects producing the injuries, the degrees of infection and the results as to vision. The most serious injuries were penetrating wounds of the eye, which occurred in 124, or 63.8 per cent, of the children. The most frequent complications were prolapse of the iris, which occurred in 52, or 41.9 per cent, and traumatic cataract, which occurred in 44, or 35.5 per cent. In 27 of the cases the eyes had to be enucleated or eviscerated. Intra-ocular foreign bodies proved to be most dangerous, as 7, or 58.3 per cent, of 12 eyes containing foreign bodies had to be enucleated ; 12 eyes were lost functionally, as the vision was nil, though the eyeball remained as a cosmetic result.

Sympathetic ophthalmia was not encountered, as conjunctival flaps were always applied to fresh wounds after the method of Kuhnt to prevent infection, and eyes showing irritation for more than two weeks were enucleated.

In view of the high incidence of loss of the affected eye (in 41, or 21.1 per cent, of the cases) despite the prophylactic measures Rabinovich urges that (1) parents be instructed to prevent their children from using instruments and playthings of a type leading to injuries of the eyes and that (2) the selling of toy pistols be absolutely prohibited. SITCHEVSKA, New York. [ARCH. OPHTH.]

Skin Diseases; Allergy

TREATMENT OF ANGIOMA OF THE FACE. F. A. FIGI, Arch. Otolaryng. **24**:271 (Sept.) 1936.

Figi states that the most effective agents and procedures in the treatment of hemangioma of the face are (1) radium, (2) electrocoagulation, (3) excision and (4) injection of sclerosing substances. Tumors of this description are found most frequently in female children, usually being present at birth. The tumors are classified as capillary or cavernous, and the origin of both types is discussed.

The cases recorded in the literature and the treatment in these cases are referred to and illustrated. It is revealed that radium is effective in the treatment of hemangioma of the face in a child. Electrocoagulation is the treatment of choice in most instances of the cavernous type in adults, whereas excision and skin grafting are used when the patient has been unsuccessfully treated with radium. Injection of a sclerosing substance is comparatively new and rapidly gaining favor. GREENWOOD, Chicago.

SERUM-SICKNESS IN RABBITS: VI. INFLUENCE OF REMOVAL OF LIPIDS FROM SERUM ON OCCURRENCE OF SERUM SICKNESS. L. JONES and M. S. FLEISHER, J. Immunol. **31**:215 (Sept.) 1936.

Intensive treatment of serum with various solvents of lipids or mixtures of such solvents may reduce the capacity of the serum to cause serum sickness in rabbits, although the results are very irregular. There was no correlation between the loss of the factor producing serum sickness and the quantitative removal of lipids from the sensitizing serum.

FOTHERGILL, Boston.

A PRACTICAL METHOD OF MEASURING AND RECORDING SKIN TEST REACTIONS. G. H. GOWEN, J. Lab. & Clin. Med. **22**:187 (Nov.) 1936.

A method of recording skin test reactions is given. A rubber stamp is used to record the size of the flare on the patient's chart, and then an arbitrary set of standards is used to denote its degree. Gowen feels that different observers will obtain practically the same results if this method is used.

McMURRAY, Galveston, Texas.

ACNE VULGARIS. J. RICHARD ALLISON, South Carolina M. A. J. **32**:1 (Jan.) 1936.

Allison gives an excellent résumé of this trying disease, classifying acne into eight groups: (1) mild acne vulgaris, usually associated with adolescence, (2) acne associated with menstrual periods, (3) acne associated with gastro-intestinal disturbances, (4) that caused by foods, (5) that caused by low sugar tolerance, (6) a type caused by an insufficient amount of proper glutens in the blood, which are sometimes helped by vaccines, (7) severe types closely associated with tuberculids of the skin and (8) the type produced by local foci of infection.

He concludes by stating: "Acne vulgaris is a serious disease of constitutional origin, requiring thorough study for its proper treatment."

WESTON, Columbia, S. C.

ICHTHYOSIS CONGENITA. R. W. B. ELLIS, Proc. Roy. Soc. Med. **29**:748 (May) 1936.

A case of ichthyosis congenita in a girl aged 2 weeks is reported. A picture of the child at the age of 4 days accompanies the report.

WILLIAMSON, New Orleans.

LIPODYSTROPHIA PROGRESSIVA. K. H. TALLERMAN, Proc. Roy. Soc. Med. **29**:749 (May) 1936.

The patient (aged 10 years) had been listless and out of sorts for about six months. The mother had noticed that his face, neck, arms and upper part of the trunk had been growing thinner.

On examination the boy was found to be thin and wasted in the face and to a lesser degree in the arms and the upper part of the trunk. The buttocks and the lower limbs were normal. All other systems were found to be normal.

WILLIAMSON, New Orleans.

SEVERE INFANTILE ACRODYNIA WITH DIGITAL MUTILATIONS, FALLING-OUT OF TEETH AND RECTAL PROLAPSE. J. CHABRUN and R. HOLLIER, Bull. Soc. de pédiat. de Paris **33**:202 (March) 1935.

Severe acrodynia in a boy 4½ years old is reported. During the course of the disease the terminal phalanges of the left index and ring fingers became black and dropped off, and about a dozen teeth fell out of the gums, one by one. Another rare complication of the disease which was observed in this boy was rectal prolapse. He was markedly emaciated, hypotonic and amyotrophic, had profuse sweat-

ing, showed photophobia and was very miserable. The condition had lasted ten months and was gradually subsiding. Treatment seemed of no avail. His pulse rate was 160. The blood pressure was not recorded.

BENJAMIN, Montreal, Canada.

SCLEREDEMA APPEARING DURING ACUTE NEPHRITIS: BLOOD STUDIES. H. JANET, R. GAUBE and J. GAUTIER, Bull. Soc. de pédiat. de Paris **33**:206 (March) 1935.

A girl 11 years old had otitis media and mastoiditis following an acute infection of the upper respiratory tract. A short time afterward she had acute hemorrhagic nephritis accompanied by scleredema of the skin, which did not involve the fingers and toes. She showed progressive improvement and recovered. It is pointed out that scleredema is a relatively benign involvement of the skin, consisting of swelling and infiltration of the collagen network; there is no inflammatory lesion or alteration of the skin papillae, and the elastic tissue is intact. Scleroderma is a much more serious condition, which begins insidiously as a scleredema and spreads gradually over the entire body. The body becomes hidebound when the stage of scleroderma with atrophy of the true skin occurs. The outlook for scleroderma is grave, and death usually supervenes within a few years. The girl presented lipemia, with an increase of the lipoids and a diminution of the proteins in the serum, and the albumin-globulin ratio was lowered. Thyroid extract was administered for a time but had no appreciable effect on the scleredema, which slowly disappeared spontaneously.

BENJAMIN, Montreal, Canada.

CUTANEOUS TUBERCULOUS LESION OF THE LOWER EXTREMITY; FISTULOUS INGUINAL ADENOPATHY; PROBABLE PRIMARY INFECTION. M. ARMAND-DELILLE and R. LESOBRE, Bull. Soc. de pédiat. de Paris **33**:215 (March) 1935.

A boy 3 years old presented an indolent ulcer over the right external malleolus and inguinal adenitis on the right, with a fistulous tract, which had persisted after an incision made six months before. The tuberculin test was positive; tubercle bacilli were grown from the discharge which exuded from the fistula, and biopsy of material from the edge of the ulcer revealed a typical tuberculous granulomatous structure with some surrounding sclerosis. There was no evidence of any other tuberculous foci in the body, including the lungs, and it is believed that this was a case of primary tuberculosis of the skin, a condition which is rare. A report of another case, which was probably one of the same condition, is appended, that of a boy 7 years old who had a lesion about 1 cm. in diameter on the left buttock and an enlarged left inguinal gland, from which pus was aspirated that showed tubercle bacilli in stained smears.

BENJAMIN, Montreal, Canada.

VASOMOTOR UPSETS OF THE EXTREMITIES, CERTAIN ALLERGIC STATES OF MICROBIC ORIGIN IN INFANTS, AND FALSE ECZEMA. S. NOGUER-MORE, Paidoterapia **14**:615 (Nov.) 1935.

Noguer-More studied false eczema, so-called because it resembles eczema as far as the lesions of the skin appear but does not follow the course of eczema. He thinks a streptococcus produces dermatitis, starting on the cheeks, and that this serves as a substratum for the development of the vasomotor troubles. That this lesion is due to a local infection seems to be true, since it starts unilaterally. Later it spreads bilaterally, owing to sensitization to the streptococcus. To a certain point the vasomotor trouble may be considered specific. It generally becomes more specific when the local infection has persisted for some time; therefore it is conditioned, exaggerated and maintained through the infection itself. Vasomotor troubles of this type are different from regular eczema because they can be corrected without radical modification of the diet. Local treatment clears up the infection—application of iodine in alcohol and of a cream in a water base for cooling. Internally epinephrine or ephedrine is used.

HERRON, Spokane, Wash.

ORCHITIS AS A PART OF SERUM SICKNESS. E. PELUFFO and E. E. EMERIC, Arch. de pediat. d. Uruguay **7**:196 (May) 1936.

Peluffo and Emeric report two cases of orchitis as an after-effect of injection of horse serum. In the first case serum sickness developed seven days after administration of diphtheria serum. This soon cleared up, but fourteen days later the patient came back with orchiepididymitis and severe abdominal pain. In the second patient, a child of 6, unilateral orchitis appeared on the eighth day after administration of diphtheria serum. There were also severe pains in the abdomen. In both cases the disturbances responded rapidly to simple therapeutic measures.

SCHLUTZ, Chicago.

A CASE OF ACRODYNIA. MIGUEL MEIRELLES, J. de pediat., Rio de Janeiro **3**:424 (Sept.) 1936.

A 2 year old boy showed the characteristic symptoms. He recovered after symptomatic treatment, but the anorexia persisted for some time.

SANFORD, Chicago.

CONGENITAL MALFORMATION OF THE THUMB-NAILS. F. DIETEL, Dermat. Wchnschr. **101**:1167 (Sept. 21) 1935.

Dietel describes the condition of a 25 year old man in whom both thumb-nails presented marked onychodystrophy. There was no family history of similar malformation, and the disorder was definitely not due to trauma.

TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

EPIDEMIC OCCURRENCE OF ERYTHEMA EXSUDATIVUM MULTIFORME. S. LEIPNER, Dermat. Wchnschr. **101**:1178 (Sept. 21) 1935.

In a home for boys, thirty of fifty-six inmates exhibited typical erythema multiforme. Most of the boys affected had had mild coryza from eight to ten days before the outbreak of the cutaneous disorder. No other cause could be found.

TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

A STATISTICAL AND CLINICAL CONTRIBUTION TO THE QUESTION OF CUTANEOUS TUBERCULOSIS IN EARLY CHILDHOOD. A. JORDAN, J. MAISEL and W. GOLUBZOWA, Dermat. Ztschr. **72**:198 (Nov.) 1935.

Of 500 young children seen between October 1932 and June 1935, 80 had cutaneous tuberculosis. In practically all of these organic tuberculosis was also present. Papulonecrotic tuberculid, scrofuloderma, lichen scrofulosorum and lupus vulgaris were observed most frequently, the relative frequency being in the order named. Of 5 patients with erythema nodosum, 4 had concomitant signs of generalized tuberculosis.

TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

MEANING OF PARALLERGY. G. BESSAU and H. FERNBACH, Jahrb. f. Kinderh. **145**: 61 (Aug.) 1935.

Bessau and Fernbach take issue with those who consider parallergy anything other than a specific reaction of the organism induced by excitants different from the primary allergen. The sensitivity against the bouillon of tuberculin rather than against the specific substance of the tubercle bacillus, in their opinion, may be taken as an example of parallergy. They feel that the claims of Moro and Keller that it is on the basis of a true allergic reaction against the tubercle bacillus are unproved.

LANDAU, Hannibal, Mo.

IMMEDIATE AND DELAYED SKIN REACTIONS. O. TEZNER, Jahrb. f. Kinderh. **145**:86 (Aug.) 1935.

Tezner feels that the results of his experiments, which are quoted, correspond with the results of Burchard's experiments with egg white. They both came to the conclusion that the delayed papular reaction is found only in parenterally sensitized children, while the immediate cutaneous reaction is found only in children with a true idiosyncrasy.

LANDAU, Hannibal, Mo.

INJURY TO THE CENTRAL NERVOUS SYSTEM FOLLOWING SERUM SHOCK. A. BANNWARTH, München. med. Wchnschr. **83**:1278 (July 31) 1936.

A patient suffered anaphylactic shock following injection of tetanus antitoxin for a wound. After three months subacute meningitis developed, and the question arises whether the serum shock was related to the meningitis. The question was sent in by a reader, who obviously omitted several important factors in the case. Bannwarth replies that he is not familiar with any injury to the central nervous system following serum shock. Neuritis may occur during the serum sickness that follows a week or so after the injection of serum. Complications involving the central nervous system during serum sickness are infrequent, although Maura has reported meningitis following injection of antimeningococcus serum.

BRAHDY, Mount Vernon, N. Y.

ANNULAR HEMORRHAGE IN THE SKIN IN INFANTILE ACRODYNIA (FEER). B. DRAGIŠIĆ, Ztschr. f. Kinderh. **55**:721, 1933.

Dragišić reports the case of a 3 year old boy with infantile acrodynia (Feer) in whom annular bleeding occurred in the skin. According to the author, this manifestation of infantile acrodynia has never before been recorded.

LEVINSON, Chicago.

EPIDEMIC OF DERMATITIS BULLOŠA IN A CHILDREN'S SUMMER COLONY. J. FLESCH, Orvosi hetil. **80**:420 (May 2) 1936.

In August 1935 in a summer colony at Lake Balaton, 12 of 280 children presented vesicular eruptions on the legs, which healed in from eight to ten days. Flesch supposes that the epidemic was caused by the plant Sonchus arvensis, which grew plentifully on the children's playground, but he could not confirm his supposition by an experiment.

GÖTTCHE, Budapest, Hungary.

Surgery and Orthopedics

RESULTS OF TREATMENT OF CONGENITAL DISLOCATION OF THE HIP. J. G. KUHNS and others, Arch. Surg. **33**:169 (July) 1936.

The authors summarize the report of Gaugele and Kienzle on 190 children with congenital dislocation of the hip treated between 1920 and 1925 who were examined ten years later clinically and roentgenologically. Good functional results were obtained in 171 children (90 per cent), who became able to walk normally. Also, 85 per cent of the patients showed roentgen evidence of satisfactory healing. In obtaining these results, the authors stressed the importance of earliest possible reduction, gentleness, and fixation in the modified Lorenz position for from eight to ten months.

KAISER, Rochester, N. Y.

THE PROBLEM OF WOUND HEALING: I. EFFECT OF LOCAL HEALING. L. S. SMELO, Arch. Surg. **33**:493 (Sept.) 1936.

Smelo has evaluated numerous topical substances purported to stimulate wound healing. The investigations were carried out in a series of sixteen patients, all in good health. Among the substances utilized, major attention was devoted to mer-

thiolate, mercurochrome, thiocresol, petrolatum gauze, solution of sodium chloride and dry gauze dressing. The observations on the effect of such local dressings on wound healing are as follows: 1. During the cicatrization of a given wound agents repeatedly applied locally during alternate periods have failed to influence the rate of repair in a consistent manner.

2. Among the substances studied no single agent, irrespective of its nature, proved outstandingly favorable or unfavorable in its action.

3. A wound will heal or fail to heal regardless of the material applied locally. The effects exerted on the processes of repair by agents applied locally are of relatively minor significance and are outweighed by other forces, many of which are probably nonlocal.

KAISER, Rochester, N. Y.

TENDON TRANSPLANTATION IN THE UPPER EXTREMITY IN POLIOMYELITIS. F. R. OBER, Cir. ortop. y traumatol. **3**:7 (Jan.-March) 1935.

Ober of Harvard University presents a most interesting article on the different technics used in surgical intervention on the upper extremity for combating the deplorable aftermaths of infantile paralysis. He points out the main operations performed on the hand, wrist, elbow and shoulder and presents a series of cases, with fifteen illustrations, in which he operated in the department of orthopedics at the Children's Hospital in Boston. He obtained excellent results and concludes that any transplant done to improve the function of the hand is worth doing if it increases the grasp of the hand and if it restores, even in a weak way, the opposing power of the thumb. Tendon transplants can be made at the wrist to relieve deformity and secure dorsiflexion of the wrist. Muscle transplants may be made at the elbow to restore partial flexor power. Muscle transplants should be made at the shoulder, whenever possible, instead of arthrodesis, to restore abductor power and prevent subluxation of the joint. All the general rules for transplanting tendon elsewhere must be applied in working on the upper extremity if one wishes to obtain success.

HERRON, Spokane, Wash.

CLINICAL EVOLUTION OF BONE GRAFTS. A. INCLÁN, Cir. ortop. y traumatol. **3**:161 (July-Sept.) 1935.

After studying about a hundred cases of bone grafts, the clinical development of which he has followed for a long time, Inclán gives his opinion with regard to the much discussed problem of the total or partial vitality of the grafted bone. He says that bone grafts behave according to the biologic purposes which they have to accomplish on the site where they have been implanted. After fulfilling their mission, they disappear as such and are replaced by newly formed and recently constructed bone according to the physiologic demands of the statics and dynamics governing their evolution and obeying the laws of Wolff. Therefore the bone graft must first take root and then keep up its integrity till the changes brought about by its presence have been completely achieved. Then the author presents a clinical and roentgenologic study of the development of bone grafts in cases of delayed union and pseudo-arthrosis of fractures, fixation of tuberculous joints and joint disturbances due to other pathologic processes, e. g., fusion of the spine and stabilization of joints.

HERRON, Spokane, Wash.

TREATMENT OF CONGENITAL DISLOCATION OF THE HIP WITHOUT FIXATION. FELIX BAUER, Wien. klin. Wchnschr. **49**:466 (April 10) 1936.

Felix Bauer states that his method of treating congenital dislocation of the hip takes into consideration both the mechanical defects and the underdevelopment of the hip joint. He uses a splint which holds the joint in abduction and permits movement of the joint after the dislocation has been set. He expresses the belief that fixation prevents normal growth of the joint. Treatment with a splint permits natural use of the hip joint. The infant learns to stand and walk at the normal time.

Bauer has treated nineteen cases of complete dislocation and thirty-four of partial dislocation by this method. Good results were obtained in every instance. A 4½ month old infant with bilateral dislocation of high degree showed mechanically and anatomically normal joints after three months of treatment. In a 6 month old infant with complete unilateral dislocation and a poorly developed socket the joint was mechanically cured after four months; that is, dislocation by adduction was no longer possible. The joint was well developed.

Even during the second year of life congenital dislocation of the hip may be successfully treated by means of a splint and braces. A 14 month old infant with unilateral dislocation was able to crawl after two weeks of treatment, stood up after four weeks and walked after six weeks. The joint was mechanically healed and well developed. Another 14 month old infant with bilateral dislocation and lack of ossification in the upper part of the femur was treated for five months. After this period the joints were no longer dislocatable; they were well developed, and the upper part of the femur showed rapid ossification. In all nineteen cases of complete dislocation treated by the author a mechanical cure was attained three months after the setting of the joint. From four to six weeks after setting, growth of the joint could be demonstrated. The disadvantage of treatment by fixation is that the joint remains underdeveloped, and osteochondritis, partial dislocation of arthritis may occur later. Treatment by a splint which does not hinder movement of the joint permits natural development.

ABT, Chicago.

Teeth and Dentistry

EXPERIMENTAL PRODUCTION OF MOTTLED ENAMEL. M. C. SMITH and E. M. LANTZ, Arizona Coll. Agric. Exper. Stat., Tech. Bull. 45, Jan. 1, 1933.

Mottled enamel in human beings is a serious defect of the enamel of the permanent teeth, which is chiefly characterized by the presence of dull chalky white areas distributed more or less irregularly over the surface of the teeth. Enamel which is mottled does not have the translucent glassy luster of the normal substance. Sometimes the whole tooth is dull white and opaque. The enamel is structurally weak and in severe cases is pitted and corroded, tending to chip off. The intercementing material between the enamel rods is lacking, at least in the outer fourth of the enamel. In severe cases the enamel rods themselves appear to be imperfectly calcified. There is a subsequent infiltration of stain into the mottled areas, which varies in color from dark brown, almost black, through orange to yellow. An investigation into the cause of mottled enamel was attempted by experimental production of the defect in laboratory animals. St. David, Ariz., is a community where all the native Indian inhabitants have moderately severe mottling of the enamel. Rats fed water from this locality did not display mottling until the water was evaporated to one tenth of its original volume: then mottling appeared. It also appeared in rats on Sherman's diet B when they were fed sodium fluoride at different levels; also, it was produced by subcutaneous or intramuscular injection of fluorides. The first indication was lack of pigment followed by loss of luster. The time of appearance and the severity of the symptoms varied with the amount of fluorides given. On discontinuation of the feeding or injection of fluorides the teeth became normal in appearance as they continued to grow. In dogs and guinea-pigs similar results were obtained. The relationship of drinking water to the defect is considered to be fully established.

VINTON, New York.

HISTOLOGIC CHANGES IN THE ENAMEL AND DENTIN OF THE RAT INCISOR IN ACUTE AND IN CHRONIC EXPERIMENTAL FLUOROSIS. I. SCHOUR and M. C. SMITH, Arizona Coll. Agric. Exper. Stat., Tech. Bull. 52, June 15, 1934.

The effect of chronic and of acute fluorosis on the enamel and dentin of the incisor was studied in twenty-seven white rats fed fluorine and in twenty-seven white rats given injections of fluorine, in respect to roentgenographic and micro-

scopic alterations. The incisors of sixteen litter mates used as controls were also studied. The findings of previous investigators were, on the whole, confirmed. Both the enamel and the dentin show a pair of light (disturbed) and dark (recovering) incremental layers for each injection of sodium fluoride. The light layer represents the immediate response to the injection and is imperfect in formation and in calcification. The dark layer represents a recovery response to the injection and is normal in formation and normal or excessive in calcification. The earliest changes in acute fluorosis are observed in animals given each a single injection of 0.3 cc. of 2.5 sodium fluoride and allowed to live only from twelve to fourteen hours after the administration. These changes are recognized in the posterior region of the incisor, within the ameloblastic layer, in the form of an abnormal character and distribution of globules. In addition, the incremental surface of the organic enamel matrix lacks its normal arrangement and is covered with hemispheric globules that stain deeply with hematoxylin. It is believed that fluorine exerts a direct local action on the enamel-forming cells and that the changes observed in the enamel and dentin are not produced primarily by changes in blood calcium and phosphorus or by disturbances in the parathyroid glands.

VINTON, New York.

RESULTS OF EXAMINATION AND TREATMENT OF TEETH IN PUBLIC SCHOOLS OF CHRASTANY. GEORGE CERNY, Zubni lék. **35**:164 (April) 1935.

The primary examination of 147 children showed 5 free from caries. One child alone had a dentally clean mouth. The percentage needing dental care was: first grade, 43; second grade, 29; third grade, 68; fourth grade, 79; fifth grade, 83; sixth grade, 83; seventh grade, 100, and eighth grade, 100. With proper cooperation of the teachers and parents, 76 per cent of the school children had hygienic mouths on the second survey.

STULIK, Chicago.

SHAPE OF THE HEAD, ANOMALIES OF TEETH, DENTAL CARIES AND THEIR INTER-RELATIONSHIP. A. N. T. AGAPOV and P. A. SOKOLOV, Azov-Black Sea Regional Pub. Co., symposium 3, article 9, 1935.

Studies were made of children between the ages of 8 and 16. In these children the growth of the head was not regular and varied in different directions. In younger groups, the absolute length and width of the skull were greater in boys than in girls. Increases in the size of the head persisted to a higher age in girls than in boys. Up to 13 years of age, the skull was broader in boys; after 13 years of age, it became broader in girls. It was not possible to establish a relationship of facial bones to the skull as reflected in their changes. The lower part of the face increased correspondingly to the upper and middle part, but the increase was smaller in all ages. In boys there was a positive relationship between the size of the face and the number of anomalies in the dental system. There were fewer dental anomalies in children with wider middle and lower facial skeletal development.

SEMENENKO-MCKHANN, Boston.

Miscellaneous

MEDICAL SUPERVISION OF THE DAY NURSERY. ETHEL S. BEER, Arch. Pediat. **53**:351 (May) 1936.

Beer states that all day nurseries should have a concrete plan for medical supervision.

ORR, Buffalo.

INTRAPERITONEAL AND VISCERAL TEMPERATURES AS INFLUENCED BY EXTERNAL ENVIRONMENT. B. R. SELDEN, Illinois M. J. **70**:159 (Aug.) 1936.

That the application of heat or of cold to the abdominal wall for the relief of pain within the abdominal cavity is often effective is a fact of common knowledge.

To ascertain the mode of action of heat and cold when applied externally Selden made an extensive series of observations of intraperitoneal temperatures, using guinea-pigs and rabbits in the laboratory, surgical patients and a few medical patients.

This report contains a great deal of detailed description of technic and tabulation of results which are not suitable for abstracting. The results may be summed up best from the author's summary and conclusions. The therapeutic application of cold to the external abdominal wall is accompanied by a decrease in the subjacent intraperitoneal temperature. A decrease in temperature but of less degree is found also in neighboring intraperitoneal regions. The therapeutic application of heat to the external abdominal wall is accompanied by an increase in the subjacent intraperitoneal temperature.

Selden believes that diathermy applied about the diaphragmatic region would be effective during an operation in maintaining the intraperitoneal temperature in the upper part of the abdomen and to a lesser degree in the lower part of the abdomen.

The application of cold, heat or diathermy to the abdominal wall is followed by a change in the general body temperature, as evidenced by the changes in the more distant intraperitoneal regions and in the rectal temperature. The amount of change is influenced by the total body area which is in contact with the thermal agent, by the length of time the agent is applied and, especially in the case of diathermy, by the depth of narcosis (light narcosis being accompanied by dyspnea and a lesser change in temperature).

The temperature of the rectum, both under normal conditions and under the influence of thermic agents applied to the abdominal wall, is variable as compared with the temperature of the pelvis and other regions within the abdominal cavity. Hence Selden questions the value of the rectal temperature as an indicator of the exact temperature within the abdominal cavity and presumably other regions of the body.

Since the rectal and pelvic temperatures continue to rise for from fifteen to twenty-five minutes after removal of the diathermy applied about the diaphragmatic region, Selden assumes that great adjustments are taking place in the circulation, resulting in both the redistribution of and the releasing of heat. He finds it interesting to speculate on the possibly extremely high intraperitoneal temperatures that could occur with a patient in a Turkish bath or any thermal or electrical contrivance for elevating the body temperature. He believes that it is possible that the intraperitoneal temperature would be enormously higher than even the very high oral or rectal temperature that could be thus obtained.

Exposure of and moderate handling of the intestines for from sixty to ninety minutes caused no changes in temperature that seemed deleterious.

BARBOUR, Peoria, Ill.

STUDIES ON BARBITURATES: XV. THE EXCRETION OF BARBITAL IN NORMAL AND NEPHROPATHIC SUBJECTS. W. P. ARGY, C. R. LINEGAR and J. M. DILLE, J. Pharmacol. & Exper. Therap. **57**:258 (July) 1936.

It has been shown that barbital is largely excreted by the kidneys and that the excretion is greatly lessened in dogs rendered nephrotic by chemical agents. The authors determined the excretion of sodium barbital in the urine in nine normal and eight nephropathic subjects. The excretion decreased from an average of 14.3 per cent in twenty-four hours in the normal subjects to 5.78 per cent in the nephropathic subjects. They wisely caution against the use of barbital or sodium barbital in such conditions. Fortunately, practically all derivatives of barbituric acid with the exception of barbital are destroyed in the body, and hence only very small amounts are excreted in the urine, so that these derivatives seem safe to use even when the kidneys are damaged.

PILCHER, Cleveland.

EUGENICS AND PROPHYLAXIS FOR CHILDREN "IN A STATE OF DANGER." J. A. SMYTHE, Bol. Inst. internac. am. de protec. a la infancia **10**:182 (Oct.) 1936.

From the seventh Pan-American Child Congress issued the statement that the application of eugenics is indispensable in the American endeavor to reduce the frightful number of children "in a state of danger." EDITOR'S SUMMARY.

SOCIAL SERVICE IN THE PROTECTIVE SYSTEM FOR MINORS. C. A. BAMBARÉN, Bol. Inst. internac. am. de protec. a la infancia **10**:189 (Oct.) 1936.

In the seventh Pan-American Child Congress it was stated that the protective system for children "in a state of danger" should organize children's homes and that all the protecting organization should be based on the principles of social service. EDITOR'S SUMMARY.

BEARING OF THE SOCIAL FACTOR ON CHILDREN'S DISEASES. ROSA B. DE BUÑO, Bol. Inst. internac. am. de protec. a la infancia **10**:219 (Oct.) 1936.

De Buño discusses the influence that the social environment may have on the health of the child and states that the interference of parents, when they make use of their rights as such, may be a drawback to the desired effect of the medical treatment.

She presents several cases that were studied at the Dr. Luis Morquio Institute of Pediatrics and Child Care, those of children who were withdrawn from the hospital by their parents against medical advice, with fatal results in some of the cases.

She points out the necessity of including in the legal regulations of public health certain provisions enabling the doctor to limit, as a defense of the health of children, the undue intervention of some parents who are guided only by ineptitude, ignorance or prejudice. This limitation might be established with the legal intervention of the Children's Council in discharge of its function of protecting the life and welfare of children. EDITOR'S SUMMARY.

QUESTIONS OF HEREDITY IN THE CHILDREN'S CLINIC. W. LEHMANN, Arch. f. Kinderh. **106**:193, 1935.

Lehmann appeals to all physicians to study, as opportunity offers, the laws of heredity. He outlines two methods of approach: (1) an investigation of the influence of heredity as compared with that of environment in the production of disease as observed in identical twins and (2) a search for clinical methods by which latent carriers of hereditary abnormalities may be recognized. The diatheses in identical twins are an important field of investigation for the pediatrician.

CRANE, Chicago.

INVESTIGATION OF THE PHARMACOLOGY AND PHARMACODYNAMICS OF CHILDHOOD: VIII. ARSPHENAMINE. A. BÁNOS and L. DOBSZAY, Arch. f. Kinderh. **106**:216, 1935.

An effort is made to explain the previously noted fact that arsphenamine disappears from the blood of infants more rapidly than from that of adults. No appreciable difference between infants and adults in the combining power of their serum proteins could be found. For comparing the proteins of different serums in their power of combining with arsphenamine the authors developed a new method, but no significant difference was found associated with age. The red blood corpuscles were shown to take no part in the transportation of arsphenamine.

CRANE, Chicago.

SLOWLY DEVELOPING CARBON MONOXIDE POISONING IN A NURSLING. A. JOSS-HUBER, Jahrb. f. Kinderh. **145**:81 (Aug.) 1935.

A 2½ month old child was ill with severe anemia and convulsions of one side, hepatic and splenic enlargement and albuminuria. The etiologic factor was found to be chronic carbon monoxide poisoning. The baby's crib was in a poorly ventilated room, very near a stove.

Recovery followed a short hospitalization.

It is pointed out that typically carbon monoxide poisoning is characterized by polycythemia except in the case of infants and the very old, in whom there seems to be an incapacity of the bone marrow. LANDAU, Hannibal, Mo.

THE TREATMENT OF DISEASE BY AUTOGENOUS BLOOD. GUNTER KELLHAMMER, Monatschr. f. Kinderh. **65**:385 (May) 1936.

Since 1923 many clinical entities have been treated by injections of autogenous blood. The results described in the German literature have been satisfactory, but Kellhammer suggests that the observations have been reported with only the most superficial control.

He has reviewed some seventy-four cases in his clinic during the years from 1926 through 1935. These included thirty instances of urogenital disease, twenty-four of infection of the upper respiratory tract, nine of pyogenic infection of the skin and twelve of miscellaneous conditions.

When the results were finally reviewed, the effect of the treatment in the majority of cases was disappointing. In only one group, that of the chronic pyurias not due to congenital abnormalities, was the treatment satisfactory.

The dose varied from 1 to 20 cc., with an average of 10. The writer sees no benefit from doses larger than the average. GERSTLEY, Chicago.

Society Transactions

CHICAGO PEDIATRIC SOCIETY

Regular Meeting, Jan. 19, 1937

ROBERT A. BLACK, M.D., *President*

JAMES H. WALLACE, M.D., *Secretary*

TREATMENT OF NEPHROSIS IN THE YOUNG CHILD. DR. F. W. SCHLUTZ.

Among the most troublesome and alarming symptoms of nephrosis are the huge losses of protein in the urine and the excessive anasarca and ascites. No form of therapy has consistently given permanent relief from these troublesome symptoms.

A few years ago A. Osman, of London, published some results from the treatment of acute and chronic forms of nephritis with large doses of alkali. He advocated this treatment particularly for conditions in which generalized anasarca and ascites were prominent.

Osman and others found that acidosis of some degree is practically always present in both acute and chronic renal disease. Phosphate accumulation seems to be the principal factor in the production of this acidosis. Most patients with nephritis seem to have a decrease in plasma bicarbonate and seem also to have an increase in tolerance toward alkali.

The high alkali therapy in renal disease is primarily based on some theories expressed by Martin Fisher over a decade ago.

It is important to know the level of the plasma bicarbonate before treating a patient's nephritis with alkalis.

Patients who have edema, high albuminuria and low urinary volume with nephritis are likely to derive the greatest benefit from alkalis if these are given in amounts sufficient to raise the plasma bicarbonate to, and maintain it at, a normal level. In favorable cases marked diuresis and subsidence of edema occur when this level is reached. The output of albumin is generally greatly diminished and may in time completely disappear. The treatment often calls for truly heroic doses of alkali and is not without danger. Overdosage must be guarded against by occasionally determining the level of the plasma bicarbonate.

The alkaline salts are given by mouth until the plasma bicarbonate reaches a normal level.

An ordinary mixed diet without restriction of protein or salt can be allowed. No excessive restriction of fluid needs to be imposed.

The alkalis are given in the form of potassium bicarbonate, potassium citrate, sodium bicarbonate and sodium citrate, generally in equal parts, in water flavored with syrup of orange U. S. P., peppermint water U. S. P. and chloroform water U. S. P.

The potassium salts are more toxic than the sodium salts. All of the salts may cause some unfavorable effects; the bicarbonates tend to cause nausea and vomiting, and the citrates, diarrhea, especially in children. All of these difficulties are best overcome by combining the salts.

If coma occurs, the alkalis may be given by rectum as a 3 per cent solution of the combined mixture. During the treatment, the total amount of urine passed in each twenty-four hours, the patient's weight and the reaction of the urine, tested in early morning specimens, must be recorded. The plasma bicarbonate should be estimated before the treatment is started and at frequent intervals during the treatment. The daily dose of alkalis can be increased from a beginning dose of from 2 to 3 Gm. to as high as 60 Gm.

The initial increase of the edema is a constant feature, but it must not deter one from fearlessly increasing the doses of alkalis. These doses must be kept high until the plasma bicarbonate reaches a normal level, and the doses must be kept continually high for some time, beyond this point. If an onset of toxic symptoms necessitates a reduction in the doses it is well to reduce only the proportion of potassium salts at first, as these are apt to be the cause of the toxic symptoms.

Diuresis of a remarkable degree usually sets in shortly after the dosage has reached its highest. This diuresis often reduces the edema in an amazingly short time and may cause complete disappearance of albumin from the urine and marked reduction of the lipemia.

Three dangerous symptoms must be looked for and guarded against, namely, tetany, cardiac weakness and excessive vomiting and diarrhea.

Tetany can be prevented by an intramuscular injection of 0.05 Gm. of calcium chloride, repeated if necessary. Cardiac weakness and excessive diarrhea are usually relieved and checked by diminishing the amount of potassium salt given. When active diuresis has set in, it is unnecessary to increase the alkali further, but the high dosage must be maintained until the edema has entirely disappeared and the volume of urine has fallen to normal. After the urinary volume has returned to normal, a gradual reduction of the dose may be effected; any return of the symptoms must be met at once by a resumption of the maximum dosage for at least a few days.

The high alkali treatment will not avail in every case of nephrosis, but it will almost certainly reduce the troublesome edema and reduce or stop the proteinuria. It cannot prevent or significantly modify the serious complications, such as pneumococcic or streptococcic pneumonia or peritonitis, but it will in some measure protect against their development.

The favorable experience in a series of cases seems to confirm Osman's report of favorable results and seems to warrant the use of this form of therapy in the treatment of chronic nephrosis and to warrant an attempt at its use in all cases in which the renal disease does not yield readily to less drastic measures.

DISCUSSION

DR. JOSEPH K. CALVIN: I certainly enjoyed Dr. Schlutz' interesting paper on a subject that is still veiled in mystery. So little is known about it that any additional knowledge is welcome, especially any that contributes to successful treatment of the condition. Dr. Schlutz described the treatment of the nephrotic syndrome by means of alkalis, a treatment with which I have had no experience. I read Osman's report some years ago but did not realize what good results could be obtained. At the Michael Reese Hospital and at the Cook County Hospital we have used the so-called acid treatment in children presenting the nephrotic syndrome. These children are put on a diet high in protein, which produces an acid ash, and on ammonium chloride in large doses, also to produce an acid ash, and the sodium ion in the diet is restricted, a procedure which also increases the acid ash and the acidity of the urine. Just as alkalis produce diuresis, as Dr. Schlutz has shown, so does a tendency toward acidosis produce dehydration and marked diuresis. This has been demonstrated in many clinics.

In addition to keeping these children on an acid-producing regimen with a view to producing an acid condition of the urine, we have used most successfully compound mercurial diuretics, such as salyrgan and mercurin, the latter a combination of a mercury compound with a purine diuretic. The difficulty in using such compound mercurial diuretics is that they cannot be administered by mouth, and it is difficult to administer repeated intravenous injections to children who have marked edema. We have been using them intramuscularly regularly and in only one instance has an abscess developed and in that it was due to a faulty technic. There has recently been produced a suppository containing a substance similar to salyrgan, to be used rectally, and some of the clinics in the East have reported very good results from its use. We have tried suppositories of this type in nephrotic children but they have not responded nearly as well as when the mercury preparation was given intramuscularly.

In this nephrotic syndrome, as Dr. Schlutz pointed out, it is difficult to evaluate any form of therapy, for there is a marked tendency for the edema and albuminuria to disappear rather suddenly and then reappear just as suddenly, irrespective of therapy. The condition has a cyclic tendency. I think that in Dr. Schlutz' cases, however, the cause and effect are definitely demonstrated, as the various factors, chemical components of the blood and other details were so carefully checked. I should like to show a few slides from cases in which my colleagues and I thought the cause and effect were demonstrated, although the observations could not be repeated consistently as in Dr. Schlutz' cases. These slides particularly demonstrate the cyclic tendency of the edema. [The slides were presented.]

Regarding the so-called nephrosis, I have been calling the conditions of this group the nephrotic syndrome, for I have decided that it is almost impossible to diagnose true nephrosis clinically unless the patient is observed over a long period of time. Although the symptoms and signs may all be present and the case is seemingly a classic example, the patient often reenters the hospital later and dies of typical chronic glomerulonephritis. If after presenting all the symptoms of so-called nephrosis the child recovers, one is prone to call the disease nephrosis; but if the child dies, the pathologist makes the diagnosis, and in my experience too frequently the pathologist's diagnosis is subacute or chronic glomerulonephritis in the so-called nephrotic stage.

I thoroughly agree, however, that there are cases of nephrosis, especially in children, but they are not nearly as common as indicated in some clinical statistics.

I am going to try the treatment with alkaline salts described by Dr. Schultz, as his results certainly have been unusually good.

Dr. C. A. Aldrich: It seems to me that a great source of the confusion in the problem of nephrosis is due to the idea that edema in the patients is always in the same stage. Years ago, before this society, I reported, I think, "the clinical course of edema" in this disease and showed that during the phase when the weight is increasing there is generalized edema in which the scalp and feet are involved to about the same degree. Then the edema curve reaches a point at which a fall of the fluid into the lower parts of the body and into the thoracic and abdominal cavities suddenly takes place. In favorable cases this happens just prior to the real diuresis. It seems to me if one pays attention to this course of the edema one has a better idea of the results one gets from therapeutics. I think I could demonstrate a striking diuresis if I gave any drug at just the right time. I have tried alkalis but not in the way that Dr. Schlutz described. His plan looks well worth while.

In support of these remarks I may cite the case of a patient who recently came into the hospital with a tremendous edema. The intern wanted to try acid salts. We did and got gratifying diuresis in about one week. On the morning of the diuresis the intern wanted to stop giving the acid salts but I advised continuance. After a time the patient had a return of the edema while still taking these salts. This emphasizes what Dr. Calvin said about the tendency for the edema and albuminuria to disappear and reappear.

Dr. Schultz' cases showed good temporary results. I should like to see the ultimate results, and he undoubtedly will report them.

I think there is such a thing as nephrosis, but the diagnosis of it must be restricted to patients whose urine has been constantly free from blood. The minute blood appears the case must be called one of chronic nephritis. Many of the patients with the latter disease are observed for months without blood appearing in the urine, but eventually it appears. My associates and I are still "standing pat" that there is such a thing as nephrosis, as we have had 30 patients who have never shown any blood in the urine during prolonged observation.

The statistics of practically every one who sees many persons with nephrosis show about the same results—approximately 50 per cent recover, and the rest die. This is the approximate result in Dr. Schlutz' series. I hope by the use of alkalis he may yet get a more satisfactory percentage than that.

Dr. F. W. Schlutz: The charts which Dr. Calvin showed, demonstrating the use of mercurial diuretics, were impressive, but it has been common experi-

ence, and it was my experience before I knew of the treatment of Osman, that in general the diuretics are apt to fail. One pins one's hope to every diuretic that comes out, but nearly all fail at the critical juncture, and the symptoms one is most anxious to relieve and about which the physician and the family have the greatest concern, the tremendous edema, one cannot relieve, and the patient dies. It is true that acid salts produce marked diuresis quite as well as alkaline salts. I have not had any experience with the acid salts but have been guided by the statement of Osman that the use of such salts is not as successful as the high alkali treatment. He stated that if one reduces the acid salts or quickly withdraws them one is likely to run into the dangerous symptom anuria, something one does not encounter with the alkaline salts. From the biochemical standpoint they act much the same. I should be afraid to use salyrgan and other mercurial agents because, as Dr. Calvin said, one is not sure whether one is not dealing with a mixed form of nephritis after all, and that there is not some renal damage. My colleagues and I have had the experience of seeing some of the patients come in later and at necropsy show glomerular nephritis. I think the mercurial preparations are somewhat dangerous in such cases.

With reference to the length of time the patients continue well, I believe Osman in his series had some that remained well for ten or twelve years. Our series goes back three years, and we have two patients that have remained well.

I agree with Dr. Aldrich that nephrosis exists and that it is found more in children and adolescents. I think the internists do not see as much of it as pediatricians do. The number of cases we have at the present moment is small, but I think one will have to admit that Osman shows 85 per cent of the patients benefited; the percentage in our small series is 90. To get this percentage of the patients edema-free is something of an achievement. The treatment does not prevent pneumonia, peritonitis or septic infection, but even with these complications the patients have a better chance when edema free.

THE ADDIS COUNT IN CHILDREN AFTER CLINICAL RECOVERY FROM POSTINFECTIOUS NEPHRITIS. DR. H. H. BOYLE.

A method for the quantitative estimation of the constituents of urinary sediment was described by Addis in 1925. He advanced the idea that the type of renal damage might be predicted from study of the sediment. The first work with children in this field was reported by Rew and Butler, who studied the sediments from urines of well children and children ill with nephritis and other acute infections. Lyttle studied the sediments from urines of normal children and set up normal standards for the various constituents. Previous to the present study no determinations had been made of the cells and casts in the sediments from urines of children who had recovered from postinfectious nephritis.

Twenty-five children were selected from a group of approximately 250 who had recovered from acute postinfectious hemorrhagic nephritis. All of these children had been observed for periods of from one-half to eight years after their nephritis and were considered to have made complete clinical recoveries according to routine clinical and laboratory observations. Counts were made of the red blood cells, white blood cells and epithelial cells and of the casts in the urinary sediment. The latter was prepared by the method originated by Addis and modified by Lyttle for children.

Except in the case of a girl who was shown on complete urologic study to have hydronephrosis, the results obtained correspond very closely to those obtained by Lyttle for a group of normal children and also to those obtained by Addis for normal adults. Pathologic sediments were not found when ordinary clinical and laboratory procedures gave normal reactions.

It is concluded that the results contribute further toward the view that children who have clinically recovered from acute postinfectious hemorrhagic nephritis do not have subacute or latent nephritis.

DISCUSSION

DR. BENGT HAMILTON: I am greatly interested in this work of Dr. Boyle's. I had hoped that he would tell this society that he was on the track of the etiologic factor in chronic nephritis, which is, of course, one of the great mysteries of pediatrics. One always knows when acute nephritis starts. One generally knows when nephrosis starts, but very few, taking ever so careful a history, can put a finger on the date when chronic nephritis starts. I entirely agree with the conclusion that acute nephritis heals and is not a precursor of the more chronic disease of the kidney.

I should like to ask whether this method will help one to find out whether ordinary colds furnish sufficient irritation to the kidneys to play a rôle in the development of chronic nephritis.

DR. ALBERT FRANK: I should like to discuss this subject from the mathematical standpoint, and I can do this best by showing some slides.

The volume of urine for the twelve hour collection period described varied, but a common amount was between 120 and 150 cc. If from a 120 cc. collection a 10 cc. sample is taken and centrifugated and all but 1 cc. of the supernatant fluid is removed, all of the sediment of the 10 cc. sample, or one twelfth of the sediment of the entire 120 cc. collection, will be present and concentrated in the remaining 1 cc. of the fluid. Drops are transferred from the concentrated sediment to a hemocytometer for counting, the unit volume of 0.0001 cc., or the volume of one large square of the hemocytometer, being used. The 1 cc. of concentrated sediment contains 10,000 times the cells of the unit volume of 0.0001 cc., and its content represents one twelfth of the cells of the total collection. In this instance, then, 1 cell per unit volume would account for 120,000 cells in the 120 cc. specimen. Casts are counted in a unit volume of 0.0009 cc.

DR. H. H. BOYLE: I can repeat only what has been expressed by Dr. Aldrich and myself, and that is that Dr. Hamilton's view regarding chronic nephritis and mine coincide very well.

As to his question regarding the common cold and nephritis, I can say only that in taking counts for children who recently had scarlet fever Lyttle found that the figures were approximately the same as those for normal children. Aside from that, I know of no other work that has been done. My colleagues and I are considering using this method for further study. I cannot answer Dr. Hamilton's question as to the value of my statistics.

I wish to thank Dr. Aldrich for his assistance and encouragement in this work and Dr. Frank and Dr. Borovsky for their technical assistance.

FUNCTIONAL CARDIAC MURMURS, WITH PARTICULAR REFERENCE TO THEIR OCCURRENCE IN INFANTS AND IN CHILDREN OF PRESCHOOL AGE. DR. WALTER J. SIEMSEN.

Some of the literature regarding the character, causation and incidence of functional cardiac murmurs is discussed.

A clinical investigation revealing an incidence of 25 per cent (from 12 to 36 per cent, depending on the number of examinations) in new-born infants and an incidence of 32, 71, 62, 60, 31 and 50 per cent for the first, second, third, fourth, fifth and sixth years, respectively, in older infants and young children (most of whom were examined repeatedly) were reported.

The clinical insignificance of functional cardiac murmurs and also the importance of their proper evaluation were pointed out.

DISCUSSION

DR. JAMES H. WALLACE: I was rather astonished at Dr. Siemsen's high figures for functional murmurs. I have an idea this may be because the ordinary soft functional murmur at the junction of the second rib and sternum is heard so frequently that pediatricians rather ignore it. It can be heard in a high percentage of children if one stops to listen for it. Nor did I realize that func-

tional murmurs are so common in infants. I wish Dr. Siemsen had been a little more explicit as to his criteria for what should be considered a functional murmur. I rather believe most of the murmurs of this type are basal. If there is an apical systolic murmur due to relative mitral insufficiency, one wonders whether it can properly be called physiologic.

At the Children's Memorial Hospital we try to be somewhat dogmatic and distinguish two types of functional murmur: a soft blowing murmur at the second interspace, which is very common, and another murmur, rather twangy in character, which one may hear along the left sternal border, reaching to the apex and shelving off rather abruptly there. One wonders if the second type is due to a congenital defect, but it is probably too frequent to be on that basis.

Dr. Clifford G. Grulee: If there is one thing I do not know anything about, it is cardiac murmurs. I think many others are in the same boat but will not admit it. Adventitial cardiac murmurs in the new-born came to my attention many years ago, when I took over the clinic at the Presbyterian Hospital. At that time I found a few infants with murmurs that I could not evaluate as congenital murmurs. After that the late Dr. Buhrman also found a few infants with murmurs which he could not account for on the basis of a congenital cardiac murmur. I think a great deal depends on the personal equation. In looking over children one person finds one thing and another something else, but I know Dr. Siemsen's work is carefully done, and I am willing to take his word for what he calls a cardiac murmur.

Dr. Arthur H. Parmelee: I think there is one feature the members might keep in mind. The fact was mentioned that the foramen ovale and the ductus arteriosus are not closed anatomically until some time after birth but that the foramen ovale is usually closed functionally soon after birth. The fact that it is closed functionally but not anatomically makes it possible for transient murmurs to occur under certain circumstances, and also makes possible transitory cyanosis. Frequently one notices that the new-born infant may have no murmur within the first twenty-four or forty-eight hours after birth but that subsequently a murmur may appear which later disappears. As Dr. Siemsen has shown, fewer murmurs are found if it is the practice to examine only once than if more examinations are made. Von Reuss explains this on the basis that conditions exist within the thorax and within the pulmonary circulation which may change under certain circumstances; that is, a severe secondary atelectasis may develop in the infant, or even a consolidation of the lung of some sort, or at least changes within the lungs that alter the amount of pressure within the various chambers of the heart. The pressure relationships within these chambers may thus revert temporarily to those that exist during fetal life, in which there is a reversal of flow which reopens the functionally closed foramen ovale and permits a flow of blood in the reverse direction, even to the extent of producing severe transitory mixed blood cyanosis. When the condition in the lungs improves, this change in relationships in the heart disappears.

Dr. Siemsen said he examined the babies when they were either asleep or quiet and undisturbed. This I think is very important, for if the child is restless or crying, the circulatory conditions within the thorax may be such as to change the pressure relationships in the various chambers of the heart to the point where they approximate those which exist during fetal life, and there will be reopening of the foramen ovale.

Dr. Walter J. Siemsen: Some of the figures for incidence reported are lower than those found in the literature, and some are higher. Repeated examinations give a higher incidence than do single examinations.

Regarding the location of the functional murmurs, I wish to repeat that it is my impression that in older children they are heard more frequently over the base, while in infants and young children they are heard oftener over the apex. All murmurs reported were heard over the apex.

Book Reviews

Tissue Immunity. By Reuben L. Kahn, D.Sc. Cloth. Price, $7.50. Pp. 707, with 90 illustrations. Springfield, Ill.: Charles C. Thomas, 1936.

This book, according to the author, presents "quantitative studies on tissue immunity . . . carried out during a period exceeding five years." Later the author says, "The incompleteness of many of the experiments presented in this volume has been a source of great concern to us." The latter statement should be borne in mind when one evaluates the book, because of its speculative nature and the sweeping generalizations drawn from admittedly incomplete experiments.

A detailed review is impossible because of the size of the volume; only its general plan, therefore, will be described. The author begins with the assumption that relatively little is known about the rôle of the tissues in immunity; from this assumption he proceeds to the hypothesis that tissue immunity is "an inherent physiologic function of all cells." From this idea he develops his thesis that immune tissues, because of their affinity for antigenic substances, constitute the primary basis of all immune reactions. These tissue affinities vary in the animal, being most marked in the skin because "this tissue, through evolutionary ages, has made first contact with micro-organisms." The localizing, or "anchoring," power of immune tissues for antigen is the essential feature of tissue immunity, and it is independent of circulating antibodies. The allergic phenomena are considered at great length, and a new classification suggested. Many clinical suggestions based on theoretical arguments are included.

A critical study of this book shows that the essential ideas are developed more from logic and theory than from factual evidence. The author has indulged in an excessive amount of speculation and has made astonishingly sweeping statements not justified by the facts. His assumption that relatively little is known about the rôle of the tissues in immunity will come as a surprise to physicians familiar with the literature on the subject of inflammation, from Virchow to Warthin. Furthermore, his emphasis on the idea that all cells participate in the immune reactions seems somewhat unnecessary in view of the well known fact that this is the fundamental assumption on which Ehrlich based his "side chain" theory.

It is unfortunate, also, that the style is so repetitious. The same idea is repeated again and again, as in the following quotations: "Through evolutionary ages, the surface tissues have been the first to be attacked by microorganisms" (page 48); "This tissue (cutaneous), through evolutionary ages has made first contact with microorganisms" (page 79); "The surface tissues, through the ages, have been first to make contact with infectious agents" (page 101); "Through evolutionary ages the skin and mucous membranes have been the first tissues with which microorganisms came into contact" (page 196); "Through evolutionary ages the skin has had the task of anchoring microorganisms that came in contact with it and of preventing their permeation into the deeper tissues" (page 354); "Through evolutionary ages the skin and mucous membranes have been the first to make contact with microorganisms" (page 431).

The greatest objection to the book, however, rests on the uninhibited tendency to make generalizations from data which are admittedly incomplete. One wonders whether real harm may not come from the application to human beings of premature generalizations based on experiments in rabbits. There is little justification for a new classification of allergic reactions in the absence of microscopic studies. The author reveals an astonishing lack of information concerning the unusually rich literature on the subject of tissue reactions in immunity, and merely dismisses the matter with the statement that relatively little is known.

The book, in brief, is not a comprehensive treatise on the subject of tissue immunity but is rather a development of the ideas of the author as to the part which he thinks tissues play in immunity. As such, its usefulness will depend on the extent to which these ideas agree with the facts.

Diseases of the Air and Food Passages of Foreign Body Origin. By Chevalier Jackson, M.D., and Chevalier L. Jackson, M.D. Price, $12.50. Pp. 994, with 2,000 illustrations, including 3 plates in colors. Philadelphia: W. B. Saunders Company, 1936.

The authors have drawn on their great experience to illustrate a full picture of disease of the food and air passages caused by foreign bodies and have presented in this volume all the information on the subject that any general physician is likely to need.

Why and how foreign bodies gain access, in what manner they cause harm, how their presence may be suspected and proved and how they may be removed are considered with great detail and clarity.

While much of the material has appeared in previous writings of these authors, here it is organized in readily available form and presented in a clear and fascinating style. There are many illustrations, including roentgenograms and fine plates of colored drawings of endoscopic images by Dr. Chevalier Jackson.

That the subject is important is illustrated by many instances in which the presence of a foreign body was not considered or was ignored, with serious results. One who reads this work carefully is not likely to overlook such a condition; he will at least refer the patient for roentgen ray or endoscopic examination, which will lead to proper relief before irreparable damage has been done or death results.

The 302 pages of concisely written text contain the meat of the book, though its chief bulk is made up of 636 pages of lists of catalogued foreign bodies, which serve as a reference that may be valuable.

The work is important, and every pediatrician and general practitioner should be familiar with it.

A Suggestion for an Experimental Trial of Alum-Treated Formalized Virus in the Active Local and General Immunization Against Poliomyelitis. By S. Peskind, B.S., M.D. Pp. 11. Cleveland: Mount Printing Company, 1935.

Peskind gives the following résumé:

"Bearing in mind the great enhancement of the immunizing power of diphtheria toxin or toxoid through precipitation with alum, the writer suggests the experimental trial of alum-treated formalized virus as an immunizing agent against poliomyelitis both for local as well as systemic immunization.

"Similarities in the antigenic behaviour of virus and germ antigens would encourage us to expect a similar effect from alum-treated virus as one gets from alum-treated diphtheria toxoid."

Richtlinien für die Kost des gesunden und kranken Kindes. By Dr. Erich Rominger and Dr. Ernst Lorenz. Price, 4.50 marks. Pp. 130. Berlin: Julius Springer, 1935.

The low cost of this book and its compact form and completeness recommend it as a reference book to all who can read German. It includes a discussion of food requirements and specific directions for the preparation of foods for normal and sick infants. Menus for the young child and the school child and special diets useful in various diseases, such as catarrhal jaundice, anemia, tuberculosis and epilepsy, are given.

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Directory of Pediatric Societies

INTERNATIONAL

International Association of Preventive Pediatrics

President: Professor G. Scheltema, 6a Herreplein, Groningen, Netherlands.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Prof. Luigi Spolverini, Policlinico Lungo Tevere Melini, 24, Rome, Italy.
Secretary: Professor Vitetti, Rome Italy.
Place: Rome, Italy. Time: Sept. 27-30, 1937.
American Committee:
Chairman: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary: Dr. L. Emmett Holt Jr., Johns Hopkins Hosp., Baltimore.

International Congress for the Protection of Children

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.
Place: Rome, Italy. Time: Oct. 4-8, 1937.

FOREIGN

British Paediatric Association

President: Dr. Leonard Findlay, 14 Wimpole St., London, W. 1.
Secretary: Dr. Arthur G. Maitland Jones, 31A Weymouth St., London, W. 1.

Paediatrický Spolok na Slovensku

President: Dr. A. J. Chura, Lazaretská 6, Bratislava, Czechoslovakia.
Secretary: Dr. S. Limbacher, Dlhá 2, Bratislava, Czechoslovakia.
Place: Pediatric Clinic, University, Bratislava. Time: Six times a year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Sir Lancelot Barrington-Ward, 85 Harley St., London, W. 1.
Secretary: Dr. K. H. Tallerman, 122 Harley St., London, W. 1.
Place: 1 Wimpole St., London. Time: Fourth Friday of each month, 4:30 p. m.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. S. Rosenbaum, 26 Bialikstr., Tel Aviv, Palestine.
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv, Palestine.

Sociedad Cubana de Pediatría

President: Prof. Félix Hurtado Galtés, Carlos III, 7, Havana.
Secretary: Dr. Carlos Hernández Miyares, San Lazaro 370, Havana.
Place: Cátedra de Clínica Infantil, Hospital Mercedes, Havana. Time: Third Thursday of every month.

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* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

NATIONAL

American Medical Association, Scientific Assembly, Section on Diseases of Children

Chairman: Dr. Ralph M. Tyson, 255 S. 17th St., Philadelphia.
Secretary: Dr. Albert D. Kaiser, 16 N. Goodman St., Rochester, N. Y.
Place: Atlantic City, N. J. Time: June 7-11, 1937.

American Academy of Pediatrics

President: Dr. Laurence R. DeBuys, 1417 Delachaise St., New Orleans, La.
Secretary: Dr. C. G. Grulee, 636 Church St., Evanston, Ill.
Place: Waldorf-Astoria Hotel, New York. Time: June 3, 4 and 5, 1937.
Region I. Place: Boston, Mass. Time: Nov. 12-13, 1937.
Region II. Place: New Orleans, La. Time: Nov. 30, Dec. 1-3, 1937.
Region III. Place: Lake Shore Athletic Club, Chicago. Time: Nov. 4-6, 1937.
Region IV. Place: Los Angeles, Calif. Time: October 1937.

American Hospital Association, Children's Hospital Section

Chairman: Dr. Howard Childs Carpenter, 1805 Spruce St., Philadelphia.
Secretary: Miss Edith F. Bateman, Shriners' Hospital for Crippled Children, St. Louis, Mo.

American Pediatric Society

President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid St., St. Louis.
Place: The Homestead, Hot Springs, Va. Time: April 29-30 and May 1, 1937.

Canadian Society for the Study of Diseases of Children

President: Dr. A. P. Hart, 1844 Bloor St., W., Toronto, Ont.
Secretary-Treasurer: Dr. Pearl Summerfeldt, Hospital for Sick Children, Toronto, Ont.

Society for Pediatric Research

President: Dr. Francis Scott Smyth, University of California Medical School, San Francisco.
Secretary: Dr. A. A. Weech, 3975 Broadway, New York.
Place: Chalfonte-Haddon Hall, Atlantic City, N. J. Time: May 4, 1937.

SECTIONAL

North Pacific Pediatric Society

President: Dr. D. M. Dayton, Medical Arts Bldg., Tacoma, Wash.
Secretary: Dr. H. T. Clay, Medical Arts Bldg., Tacoma, Wash.
Place: Portland, Ore. Time: June 1937.

Southern Medical Association, Section of Pediatrics

Chairman: Dr. Gilbert Levy, 20 S. Dunlap St., Memphis, Tenn.
Secretary: Dr. Hughes Kennedy Jr., Highland Plaza Apts., Birmingham, Ala.

STATE

Alabama Pediatric Society

President: Dr. Wallace A. Clyde, Employees' Hospital, Fairfield.
Secretary-Treasurer: Dr. M. G. Neely, Employees' Hospital, Fairfield.
Place: Birmingham. Time: April 19, 1937.

Arkansas State Pediatric Association

Chairman: Dr. A. C. Kirby, 701 Main St., Little Rock.
Secretary: Dr. Madeline M. Melson, 909 Main St., Little Rock.

California State Medical Society, Section on Pediatrics

Chairman: Dr. Edward B. Shaw, 384 Post St., San Francisco.
Secretary: Dr. E. Earl Moody, 3780 Wilshire Blvd., Los Angeles.

Florida State Pediatric Society

President: Dr. Luther W. Holloway, 117 W. Duval St., Jacksonville.
Secretary: Dr. Warren W. Quillian, 227 Avenue Aragon, Miami.
Place: Concurrent with state association meeting at time of convention.

Georgia Pediatric Society

President: Dr. Mercer Blanchard, 1301 Broadway, Columbus.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St., N. E., Atlanta.

Hezekiah Beardsley Pediatric Club of Connecticut

President: Dr. Howard W. Brayton, 179 Allyn St., Hartford.
Secretary: Dr. Joseph L. Hetzel, 103 N. Main St., Waterbury.

Indiana State Pediatric Society

President: Dr. Ernest R. Carlo, 2902 Fairfield Ave., Fort Wayne.
Secretary-Treasurer: Dr. Mathew Winters, 23 E. Ohio St., Indianapolis.
Time: Two meetings a year.

Louisiana State Pediatric Society

President: Dr. Edwin A. Socola, 2000 Tulane Ave., New Orleans.
Secretary-Treasurer: Dr. Ruth Aleman, 1407 S. Carrollton Ave., New Orleans.

Medical Society of State of New York, Section on Pediatrics

Chairman: Dr. George M. Retan, 459 James St., Syracuse.
Secretary: Dr. John D. Craig, 33 E. 61st St., New York.

Michigan State Medical Society, Pediatric Section

Chairman: Dr. Edgar E. Martmer, 749 David Whitney Bldg., Detroit.
Secretary: Dr. C. R. Dengler, 131 W. Michigan Ave., Jackson.

Mississippi State Pediatric Society

President: Dr. Harvey F. Garrison, 319 E. Capitol Pl., Jackson.
Secretary-Treasurer: Dr. Guy C. Jarratt, 920 Crawford St., Vicksburg.
Place: To be designated by Society. Time: Yearly.

Nebraska Pediatric Society

President: Dr. J. A. Henske, 1614 Medical Arts Bldg., Omaha.
Secretary-Treasurer: Dr. J. H. Murphy, 915 Medical Arts Bldg., Omaha.
Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

North Carolina Pediatric Society

President: Dr. Leroy J. Butler, 405 N. Spring St., Winston-Salem.
Secretary: Dr. C. A. Street, 405 N. Spring St., Winston-Salem.

Oklahoma State Pediatric Society

President: Dr. B. H. Nicholson, 301 N. W. Twelfth St., Oklahoma City.
Secretary: Dr. Hugh C. Graham, 1501 S. Baltimore Ave., Tulsa.
Place: Tulsa: Time: May 10-11, 1937.

Pennsylvania Medical Society, Pediatric Section

Chairman: Dr. Joseph Stokes, Children's Hospital, Philadelphia.
Secretary: Dr. Theodore O. Elterich, 310 Medical Arts Bldg., Pittsburgh.

South Carolina Pediatric Society

President: Dr. Leland B. Salters, 317 S. Warley St., Florence.
Secretary-Treasurer: Dr. D. Lesesne Smith Jr., 187 Oakland Ave., Spartanburg.

Tennessee State Pediatric Society

President: Dr. Joe T. Smith, 702 Medical Arts Bldg., Knoxville.
Secretary: Dr. Kinsey M. Buck, 1193 Madison Ave., Memphis.

Texas Pediatric Society

President: Dr. George B. Cornick, 507½ E. Houston St., San Antonio.
Secretary-Treasurer: Dr. F. H. Lancaster, 1507 Medical Arts Bldg., Houston.

Virginia Pediatric Society

President: Dr. Basil B. Jones, 1028 W. Franklin St., Richmond.
Secretary: Dr. W. A. McGee, 616 W. Grace St., Richmond.

West Virginia State Medical Society, Section on Pediatrics

President: Dr. John T. Thornton, 58, 16th St., Wheeling.
Secretary: Dr. Claude L. Holland, 400 Locust Ave., Fairmont.

LOCAL

Academy of Medicine of Cleveland, Pediatric Section

Chairman: Dr. J. D. Pilcher, City Hospital, Cleveland.
Secretary: Dr. William M. Champion, 2323 Prospect Ave., Cleveland.
Place: Cleveland Medical Library Bldg. Time: October, December, February and April.

Academy of Medicine, Toronto, Section of Pediatrics

President: Dr. T. B. Verner, 170 St. George St., Toronto.
Secretary: Dr. D. V. Hutton, 170 St. George St., Toronto.

Bronx Pediatric Society

President: Dr. Daniel J. Dolan, 420 E. 159th St., New York.
Secretary: Dr. Samuel T. Levethan, 254 E. 184th St., New York.
Place: Concourse Plaza Hotel, 161st St. and Grand Concourse. Time: Every second Wednesday of each month, except June, July, August and September.

Brooklyn Academy of Pediatrics

President: Dr. Thurman B. Givan, 115 Remsen St., Brooklyn.
Secretary: Dr. John A. Monfort, 861 Carroll St., Brooklyn.
Place: Kings County Medical Society Bldg. Time: Fourth Wednesday of each month, except May, June, July, August and September.

Central New York Pediatric Club

President: Dr. Frank Vasder Bogert, 111 Union St., Schenectady.
Secretary: Dr. Frank J. Williams, 58 S. Swan St., Albany.
Place: Various cities in New York. Time: Third Thursday of April and September.

Chicago Pediatric Society

President: Dr. Robert Black, Del Prado Hotel, Chicago.
Secretary: Dr. James H. Wallace, 715 Lake St., Oak Park, Ill.
Place: Children's Memorial Hospital, 710 Fullerton Ave. Time: Third Tuesday of each month, October to May, inclusive.

Dallas Pediatric Society

President: Dr. John Young, 3930 McKinney Ave., Dallas, Texas.
Secretary-Treasurer: Dr. John E. Ashby, 3622 Fairmount Ave., Dallas, Texas.
Place: Bradford Baby Hospital. Time: 1 p. m., second and fourth Saturdays of each month.

Detroit Pediatric Society

President: Dr. Edward A. Wishropp, 10 Peterboro St., Detroit.
Secretary: Dr. W. J. Scott, 5140 Second Ave., Detroit.
Place: Wayne County Medical Society. Time: 8:30 p. m., first Wednesday of each month from October to June, inclusive.

Fulton County Medical Society, Pediatric Section (Atlanta, Ga.)

Chairman: Dr. Joseph Yampolsky, 478 Peachtree St., Atlanta.
Secretary: Dr. T. I. Willingham, 384 Peachtree St., Atlanta.
Place: Academy of Medicine, 38 Prescott St., N. E. Time: Second Thursday of each month from October to April, 8 p. m.

Houston Pediatric Society

President: Dr. Walter F. Qualtrough, 920 Westheimer Ave., Houston, Texas.
Secretary-Treasurer: Dr. Allan Bloxsom, 4402 Travis St., Houston, Texas.
Place: Houston Club. Time: Third Monday of each month.

Intermountain Pediatric Society

President: Dr. Eugene Smith, 385 Twenty-Fourth St., Ogden, Utah.
Secretary-Treasurer: Dr. W. C. Cheney, 837 Boston Bldg., Salt Lake City, Utah.
Place: Salt Lake City, General Hospital. Time: First Thursday of each month, 8 p. m.

Kansas City (Missouri) Pediatric Society

President: Dr. W. R. Moore, 620 Francis St., St. Joseph.
Secretary: Dr. F. S. Hogue, 1103 Grand Ave., Kansas City.
Place: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

President: Dr. Edwin F. Patton, 3875 Wilshire Blvd., Los Angeles.
Secretary-Treasurer: Dr. Henry F. Gallagher, 1930 Wilshire Blvd., Los Angeles.
Place: Los Angeles County Medical Headquarters, 1925 Wilshire Blvd.
Time: Second Monday of February, April, June, October and December.

Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

President: Dr. Harry Apfel, 988 Park Pl., Brooklyn.
Secretary: Dr. Max Palinsky, 1270, 45th St., Brooklyn.
Place: 1313 Bedford Ave., Brooklyn. Time: Third Wednesday of each month, October to May.

MEDICAL SOCIETY OF THE COUNTY OF QUEENS, INC., SECTION ON PEDIATRICS

Chairman: Dr. W. C. A. Steffen, 42 Union St., Flushing, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144, 38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

MEMPHIS PEDIATRIC SOCIETY

President: Dr. W. D. Mims, 1042 Madison Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. W. R. Graves, 1193 Madison Ave., Memphis, Tenn.
Place: Memphis General Hospital. Time: Second Tuesday of each month, except June, July and August, 8 p. m.

MILWAUKEE PEDIATRIC SOCIETY

President: Dr. George F. Kelly, 425 E. Wisconsin St., Milwaukee.
Secretary: Dr. Helen Jane Zillmer, 781 N. Jefferson St., Milwaukee.
Place: Children's Hospital. Time: Second Wednesday of each alternate month, beginning with February.

NEW ENGLAND PEDIATRIC SOCIETY

President: Dr. Henry E. Utter, 122 Waterman St., Providence, R. I.
Secretary-Treasurer: Dr. Henry E. Gallup, 1101 Beacon St., Brookline, Mass.
Place: Boston Medical Library. Time: Four meetings a year, occurring from September to May.

NEW YORK ACADEMY OF MEDICINE, SECTION OF PEDIATRICS

Chairman: Dr. Alexander T. Martin, 107 E. 85th St., New York.
Secretary: Dr. Philip M. Stimson, 25 Claremont Ave., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

NORTHWESTERN PEDIATRIC SOCIETY

President: Dr. A. V. Stoesser, University Hospital, Minneapolis.
Secretary: Dr. Roger L. J. Kennedy, Mayo Clinic, Rochester, Minn.
Place: Minneapolis, St. Paul, Duluth and Rochester. Time: January, April, July and October.

OKLAHOMA CITY PEDIATRIC SOCIETY

President: Dr. A. L. Salomon, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 1200 N. Walker St., Oklahoma City.
Time: Alternate months.

PHILADELPHIA PEDIATRIC SOCIETY

President: Dr. H. H. Perlman, 1904 N. Franklin St., Philadelphia.
Secretary: Dr. James E. Bowman, 4091 Comly St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday of each month from October to June, inclusive.

PITTSBURGH PEDIATRIC SOCIETY

President: Dr. James LeRoy Foster, Highland Bldg., Pittsburgh.
Secretary-Treasurer: Dr. E. R. McClusky, 3200 Fifth Ave., Pittsburgh.
Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate months from October to April, inclusive.

Richmond Pediatric Society

President: Dr. Lee E. Sutton, Jr., 2601 Grove Ave., Richmond, Va.
Secretary-Treasurer: Dr. Louise Fry Galvin, 2416 Stuart Ave., Richmond, Va.
Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: First Thursday of each month (except July, August and September).

Rochester Pediatric Society

President: Dr. F. W. Bush, 29 N. Goodman St., Rochester, N. Y.
Secretary: Dr. David Wolin, 16 N. Goodman St., Rochester, N. Y.
Place: Arranged by program committee. Time: Second Friday of each month.

Rocky Mountain Pediatric Society

President: Dr. James E. Russell Jr., 820 Metropolitan Bldg., Denver.
Secretary: Dr. F. Craig Johnson, 1850 Gilpin St., Denver.
Place: Children's Hospital, Denver. Time: First Saturday of each month from September to May, inclusive, 2:30 p. m.

St. Louis Pediatric Society

President: Dr. John Zahorsky, 536 N. Taylor Ave., St. Louis.
Secretary-Treasurer: Dr. Max Deutch, 634 N. Grand Blvd., St. Louis.
Place: St. Louis Medical Society. Time: Third Friday of every month.

Seattle Pediatric Society

President: Dr. Frank H. Douglass, Medical Dental Bldg., Seattle.
Secretary: Dr. C. Lu Verne Smith, Stimson Bldg., Seattle.
Place: College Club. Time: Third Friday of each month, 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Howard R. Cooder, 3875 Wilshire Blvd., Los Angeles.
Secretary: Dr. Philip E. Rothman, 3875 Wilshire Blvd., Los Angeles.
Place: University Club of Los Angeles. Time: First Wednesday in January, March, May September and November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. M. Cooperstock, Northern Michigan Children's Clinic, Marquette.
Secretary: Dr. D. Murray Cowie, University of Michigan, Ann Arbor, Mich.

Westchester County Medical Society, Pediatric Section (New York)

President: Dr. Louis V. Waldron, 149 N. Broadway, Yonkers, N. Y.
Secretary-Treasurer: Dr. Fairfax Hall, 421 Huguenot St., New Rochelle, N. Y.
Place: Grasslands Hospital. Time: Third Thursday, October, December, February and April.